Environmental Assessment
Port-Orford-Cedar Management in Redwood National and State Parks
Del Norte County, California

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INTRODUCTION

Port-Orford-cedar (POC) is an ecologically and economically valuable native conifer growing only in northern California and southern Oregon. POC is threatened by a root disease caused by a non-native pathogen, *Phytophthora lateralis* (PL). The root disease is almost always fatal, although a small percentage of POC appear to be naturally resistant. The disease threatens the long-term survival of POC in some areas because it has a limited range and spotty distribution. In Redwood National and State Parks (Figure 1), some POC are infected with the disease and are dead or dying.

POC root disease is caused by PL spores that are carried in water. Movement of the disease into new watersheds is most frequently caused by disease-infested mud adhering to heavy equipment or other vehicles, and falling off in uninfested areas under conditions favorable to the disease (availability of moisture and host trees). Footwear and animals can also carry disease-infested mud. The pathogen has existed in the Little Bald Hills area of the parks since at least 1981. Currently there are at least six more infestations known in Redwood National and State Parks (RNSP), most of which are scattered individual trees along Mill Creek, Cedar Creek, and the main Smith River (Figure 2). It is likely that infestations in the parks and on adjoining privately and publicly held land will grow in number since the main forks of the Smith River upstream of the parks are infested.

In RNSP, POC occurs primarily in the Smith River watershed in the northern part of the parks in Del Norte County, with some POC occurring farther south in the Klamath River watershed. Prior to the establishment and expansion of the national park in 1968 and 1978, POC was included in post-timber harvest seed mixtures that were aerially distributed in what is now the southern part of the parks in and near the Redwood Creek drainage in Humboldt County. These planted trees are considered to be an exotic plant and are not included in the management proposals presented in this plan.

The National Park Service (NPS) proposes to manage POC in RNSP to slow the spread of the disease within the parks and onto adjacent lands, particularly those managed by the US Forest Service (USFS) in northwestern California and southwestern Oregon where POC plays an important ecological role in addition to its economic value.

Purpose and Need for Action

The purpose of the action is to maintain POC populations in RNSP over the long-term by protecting healthy POC, slowing the spread of root disease within the parks, and reducing the potential for the transmission of PL to uninfested areas including areas outside of RNSP.

It is NPS policy "...to maintain, rehabilitate, and perpetuate" the integrity of park resources (USDI 2000) and prevent resource degradation by managing, controlling, and/or eradicating introduced species that threaten native species. PL is an introduced alien pest species, non-native to the U.S.

POC is a component of several plant associations in RNSP. Most of the POC stands within the parks are at moderate or high risk of infestation by the disease (Jimerson and Jones, 2001). High-risk areas are low-lying wet areas that are located down slope from already infested areas or below likely sites for future introductions, especially roads. Low-risk areas are not influenced by wet conditions or periodic water flow and are not contiguous with high-risk areas. Appendix Two describes the factors used to determine the risk from a project of spreading root disease. Infestations that occur along roads and trails not only kill the trees that are infected, but serve as sources for the disease to be picked up and transported into new areas within the parks and onto adjacent publicly and privately held lands. A programmatic strategy for identifying, treating, and preventing disease infestation sites is needed to slow the spread of the disease in the parks and afford better protection to native POC

stands in the parks and on adjacent lands.

Background

Redwood National Park was established by Congress in 1968 and expanded in 1978. Three California State Parks are included within the congressionally authorized boundary of Redwood National Park — Prairie Creek Redwoods State Park, Del Norte Coast Redwoods State Park, and Jedediah Smith Redwoods State Park. The state parks are under the jurisdiction of the California Department of Parks and Recreation (CDPR). In 1994, the NPS and CDPR signed a Memorandum of Understanding providing for joint management of the four parks as a partnership under the name Redwood National and State Parks. Where the term "parks" is used in this document, it may apply to any portion of one of the state parks or the national park included in the partnership.

In the areas where POC occurs naturally, RNSP is bordered by private, state, federal, and Tribal lands. Almost all the naturally occurring POC in the parks are in Del Norte County north of the Klamath River. U.S. Highway101 and U.S. Highway 199 provide the main highway access through this part of the parks. Hiouchi, located on US 199 ten miles east of Crescent City, is the community closest to the areas in RNSP where POC are infested with PL. There are also private residential lands adjacent to RNSP along Douglas Park Road on the south bank of the Smith River across from Hiouchi. In Jedediah Smith Redwoods State Park, Douglas Park Road becomes Howland Hill Road. Howland Hill Road is a scenic unpaved road along Mill Creek that enters national park lands and reenters private residential lands east of Crescent City. Howland Hill Road is an alternate route between Crescent City and US 199 east of Hiouchi. The Elk Valley Rancheria of California, a federally recognized tribe, owns lands along Howland Hill Road close to the RNSP boundary.

In addition to the three state parks within RNSP, CDPR manages adjacent lands that are not part of the RNSP partnership. The upper portion of the Mill Creek watershed was recently acquired by CDPR. Mill Creek is a tributary of the Smith River that enters the river at Stout Grove, a major visitor attraction in Jedediah Smith Redwoods State Park located off Howland Hill Road. Mill Creek is an important anadromous fish stream. The lower portion of Mill Creek through Jedediah Smith Redwoods State Park contains uninfested POC in the riparian vegetation associations along its banks. Two small infestation sites are known in the Mill Creek acquisition. The NPS is working cooperatively with CDPR to prevent further spread of root disease into the Mill Creek acquisition. Roads through the uninfested area in the Mill Creek acquisition provide administrative access to the Little Bald Hills in RNSP (Figure 3).

The Smith River National Recreation Area (NRA) managed by the Gasquet Ranger District of Six Rivers National Forest borders RNSP to the east. The U.S. Forest Service (USFS) has taken the lead on POC root disease management in northern California. The disease already infects the three main drainages of the Smith River (BLM/USFS 2003) within the NRA. All presently uninfested POC stands bordering the Smith River and its tributaries are at high risk of infestation (Jimerson 1999), particularly those below the high water mark on the Smith River. The USFS is currently developing a regional POC Conservation Strategy (Thomas Jimerson, Plant Ecologist, Six Rivers NF, pers. comm.) in cooperation with the Bureau of Land Management (BLM) in southern Oregon. The NPS and CDPR are cooperating with the USFS to manage their respective lands to reduce the risk of spreading POC root disease into uninfested areas within the Smith River watershed.

Range wide distribution and ecology of Port-Orford-cedar

Port-Orford-cedar is a conifer in the cypress family. It is endemic to a small area of northern California and southwestern Oregon and is a component of more than 88 plant associations throughout this limited range (USDA-USDI 2003, Jules et. al. 2001). In California, the species is primarily found in the Coast Ranges, Siskiyou and Klamath Mountains, and east into the upper Sacramento Valley. POC exhibits "wide ecological amplitude" and is associated with a variety of environments, spanning elevations from sea level to 6,400 feet, growing on soils derived from a variety of parent materials, and occupying a range of riparian and upland

ecosystems. In the California portion of its range, POC is frequently associated with wet and riparian habitats (USDA-USDI 2003, Jimerson et. al. 1995, Hansen et. al. 2000). POC is also one of a small number of tree species able to thrive on ultramafic soils. These soils are derived from serpentine or peridotite parent material and have high concentrations of heavy metals that are toxic to most plants (Ullian and Jules 1999). On these sites, POC is often found in association with rare plant species (Jimerson et. al. 1995) and associations with high species richness (Jimerson and Creasy 1991). Where POC is the dominant tree species, it also shades streams, stabilizes stream banks, and provides long lasting in-stream coarse woody debris, all functions that are critical components of high quality salmonid habitat.

Port-Orford-cedar Distribution in RNSP

POC is a relatively minor component of park vegetation. It does not form extensive, pure stands and it does not provide critical ecological function along riparian corridors or on ultramafic soils. The parks contain a small percentage of POC within the overall range of the species. In RNSP, POC in the Little Bald Hills occurs on ultramafic soils derived from serpentine. A majority of the rare plant species in the parks also occur on serpentine soils, although generally in more open areas than where POC occurs

In 2001, USFS plant ecologists mapped POC plant associations in RNSP as part of a statewide POC mapping effort (Jimerson and Jones, 2001, Jimerson et. al., 1999). One goal of the USFS mapping effort is to describe the old-growth redwood dominated plant associations that contain POC and might be unique to RNSP.

Port-Orford-cedar areas are defined as forested vegetation associations composed of at least 20 % cover of POC (Figure 2). The USFS mapped approximately 1095 acres within the redwood/Port-Orford-cedar, tanoak/Port-Orford-cedar, and Port-Orford-cedar vegetation sub-series in the parks. POC is also found as an occasional component scattered in mixed evergreen and old-growth redwood forests throughout the north district of the parks. POC was most often found as a component of old-growth redwood dominated forests in Jedediah Smith Redwoods State Park (approximately 740 acres) and on ultramafic soils in tanoak and Douglas-fir dominated second-growth forests in the Little Bald Hills (approximately 355 acres). It is also occasionally found in small stands as a dominant species.

Port-Orford-cedar Root Disease

POC root disease was first detected in 1923 on nursery stock POC near Seattle, Washington, although its origin in the nursery is unknown. By 1952 the disease had spread into the native range of POC and by 1980 the disease had moved down into northern California. It is currently estimated that nine percent of mapped USFS and BLM POC land in Oregon and California is infested with PL. (USDA-USDI, 2003, Jimerson et. al. 1999). In California, the majority of infestations are located in the Smith River watershed in the Smith River NRA, with some additional isolated infestation pockets in the Klamath, Trinity, and Sacramento River drainages (Jimerson et. al. 1999, Jimerson, pers. comm.).

PL belongs to a group of organisms that includes water molds, rusts, seed-dampening molds, downy mildews and fish parasites. The genus *Phytophthora* is found throughout the world, and encompasses numerous plant pathogens including the organism that causes Sudden Oak Death, credited with widespread mortality of several species of oak and other trees and shrubs in California since 1995, and the potato blight that caused the Irish potato famine.

PL is capable of producing several different types of reproductive spores. Its rapid spread is attributable to two of these, the motile zoospores and the thick-walled chlamydospores. The zoospores are delicate structures that can detect the presence of a the host species and swim a short distance toward it, or, in the absence of a nearby host, can become a cyst capable of surviving a longer journey through moving water with the potential to land on and infect a host further downstream. The chlamydospores are long-lived and much more resistant to drying. They can survive for up to seven years on POC roots, and are easily transported in the organic matter found in soil and mud. The pathogen can also spread from an infected tree to an uninfected tree through root grafting (roots from

one tree that have grown onto and fused with roots of another tree) (USDA-USDI 2003).

Disease Movement

Short and long-distance movement of the pathogen is largely attributable to human activity involving heavy equipment and other vehicles that can pick up infested mud and deposit it near uninfested POC stands. Footwear and animals are implicated in shorter distance movement of the disease (USDA-USDI 2003; Hansen et. al. 2000; Jules et. al. 2001). For the disease to successfully colonize a new area, it must be deposited near an available host and the conditions must be favorable to infestation. Running or standing water is needed for successful introductions. Favorable conditions include cooler temperatures and available moisture. The general pattern of infestation begins when PL-infested mud is picked up on vehicle parts (tires, tracks, undercarriages etc.), footwear or animal feet (particularly hooves). It is then transported for some distance and deposited near a healthy POC tree. If conditions are good, the spores can then infect the roots of the host tree. Once trees become infected, PL will continue to produce spores until it runs out of healthy trees. In addition to spreading when infested mud is picked up and deposited near another host, the disease can also spread to other trees via root grafting or by being carried in running water, either runoff or a watercourse such as a stream or river. Dead trees do not spread PL because the spores cannot survive after the tree dies.

Since POC are prolific seeders, new seedlings can continually become established in infested areas, maintaining the disease on that site. Continued removal of the potential host trees in an infested area can eventually kill the disease, but since the spores can live without a host for up to seven years, this process requires a commitment to continual removal of seedlings throughout the seven year time frame of spore persistance. Riparian areas are at highest risk of infestation because conditions are favorable to the disease throughout the year.

Jules et. al. (2001) found that most infested watersheds became infested at a point where an unpaved logging road intersected a stream, with the infestation spreading downstream from the road crossing. Factors favoring disease spread included size of a watershed and abundance of POC in an area. Larger streams are more likely to become infested and greater POC abundance results in a greater likelihood that a drainage will become infested. The distance from where a road crosses a stream to the nearest downstream host is correlated with infestation potential– the farther away the first POC tree occurs, the less likely the drainage is to become infected.

Port-Orford-cedar Root Disease in RNSP

Figure 2 shows the POC vegetation series distributions from Jimerson and Jones (2001) and known infestation sites. Seven infestation sites were mapped from recent RNSP field surveys and Jimerson and Jones (2001) field notes. Sites listed as "Possible Sites" are areas where individual POC trees appear unhealthy but the disease has not been confirmed.

Site 1 is a small infestation site on the southwest side of a spur road off Walker Road that was probably infected via road maintenance equipment. The size of the infestation is not likely to expand because the infected POC is widely scattered and not likely to spread the infection to healthy trees.

Sites 2 and 3 are on the north side of US 199 on the west end of Hiouchi Bridge and are not expected to spread PL because there are no trails or roads through these sites.

Site 4 is in Jedediah Smith Redwoods State Park on the southwest side of the Hiouchi Bridge on US 199 at the trailhead on the north end of the Hiouchi trail, a popular hiking trail that runs for two miles between the Smith River at Hiouchi Bridge along the south bank of the river to Mill Creek across from Stout Grove. The infested area is 1-2 acres in size and could potentially serve as a source for infested mud to be picked up on footwear and moved to uninfested locations.

Site 5 is near NPS employee housing located on the south side of US 199 one-quarter mile west of Hiouchi, and contains six POC, three of which are infected.

Site 6 is on Pacamo Camp Road in Jedediah Smith Redwood State Park. Site 6 is less than one-quarter acre in size. Sites 5 and 6 are park employee housing areas and general public use is discouraged, which reduces the chance of spreading PL because fewer people and vehicles occupy the site.

The main infestation site in RNSP is along the Little Bald Hills Trail (Figure 2, site 7). The infestation in the Little Bald Hills is estimated to cover as much as 25 acres.

There are other small localized infestation sites along the Smith River in Jedediah Smith Redwoods State Park and on private lands in the adjacent communities of Hiouchi, including the Douglas Park residential neighborhood just east of Stout Grove. Over the past five to ten years, infected trees are reported to have been removed from a site above the Hiouchi Information Center, located on US 199 across the highway from Jedediah Smith Redwoods State Park, and from within the Jedediah Smith Redwoods State Park campground.

History of Root Disease in the Little Bald Hills

The largest infection site in RNSP is in the Little Bald Hills (Figure 2, Site 7) in the national park. The Little Bald Hills area was transferred from the USFS to Redwood National Park in 1972. The parcel was bisected by what was then the Little Bald Hills Road, which originated at Douglas Park Road and ran on the east side of Cedar Creek to join a four-wheel-drive road that once ran down to the South Fork of the Smith River. The PL infestation was first noted along this road in 1981. The infestation most likely originated from infested mud dropping off a vehicle where the former road crossed a wet spot. In 1987, the Little Bald Hills Road was outsloped and converted to the Little Bald Hills hiking trail. Contract specifications for the road-to-trail conversion included equipment-cleaning requirements to prevent the movement of infested soil along the road (Johnson 1989, Popenoe 2001, T. Spreiter, pers. comm.). Over the intervening years, the PL infection site has grown to an estimated 25 acres.

In 1992, the Little Bald Hills Trail was opened to equestrians as well as to hikers. The trail begins near Stout Grove in Jedediah Smith Redwoods State Park, crosses national park lands, and joins the USFS Paradise Trail that runs to South Fork Road, a county road along the South Fork of the Smith River. In 1999, out of growing concern for the continued spread of PL throughout its range, USFS pathologists and forest ecologists recommended active management to prevent the spread of PL from the Little Bald Hills infestation site to uninfested areas in the parks and adjacent lands. Because wet areas and mud on the trail were a likely source for spreading the disease within and out of the parks, the NPS and CDPR in 2001 implemented a seasonal closure of the Little Bald Hills Trail during the wet season, November through May, which corresponds to a USFS seasonal closure of their portion of the trail.

ALTERNATIVES

The no action alternative (Alternative 1) and two action alternatives, including several actions common to both of these action alternatives, are presented here. Alternative 1 (no action) describes the current management of POC and measures in place to reduce the continued spread of the disease within and outside the parks. Alternative 1 includes seasonal closure of the Little Bald Hills Trail and public education. Alternative 2, the proposed action, includes rerouting the Little Bald Hills Trail to bypass the known infestation site, improving the Hiouchi Trail and any other trail that poses a high risk of spreading PL, and removal of healthy POC located adjacent to diseased POC in small localized infection zones (localized sanitation). Alternative 3 (preventative sanitation) includes removal of all healthy and diseased POC of all sizes within 25 to 50 feet on each side of roads and trails until no POC are available to serve as hosts for PL and continued seasonal closure of the Little Bald Hills Trail.

Environmentally Preferable Alternative

The environmentally preferable alternative is that alternative that best meets the requirement of the National Environmental Policy Act (NEPA) for Federal agencies to preserve, protect, and enhance natural and cultural resources with the least damage to the biological and physical environment, while attaining the widest range of beneficial used of the environment without degradation, risk to health or safety, or other undesirable or unintended consequences.

Alternative 2, the proposed action, is the environmentally preferable alternative because it offers the best chance to reduce the spread of PL by treating the most serious infestation through moving a section of the Little Bald Hills trail, making minor improvements to the Hiouchi Trail, and removing only a few healthy POC trees from along the Hiouchi Trail, while providing year-round recreational access. The no action alternative (Alternative 1) would allow PL to continue to spread within RNSP, which would result in continued loss of POC at an increased rate, and continued seasonal closure of the Little Bald Hills Trail would deny recreational access for half the year. Alternative 3 (preventative sanitation) would eradicate a native species from portions of the parks without assurance that eradication would be effective in protecting those POC that would remain, and would continue to deny recreational access to a major park trail for half the year.

Alternative One (No Action)

The primary management for POC in RNSP is the seasonal closure of the Little Bald Hills Trail and informing and educating park visitors about POC and root disease. The Little Bald Hills trail would continue to be closed seasonally in cooperation with the USFS, with interpretive signs at the Little Bald Hills trailhead describing the reasons for closures. The Little Bald Hills trail connects to the Paradise Trail in Six Rivers National Forest. The Paradise Trail is also closed during the wet season (generally November-May) and is signed to explain the reason for closure. The trail closures were implemented in 2001. The NPS and CDPR would continue to present information on POC in park publications and in visitor contact areas, and would include POC-related issues in interpretive programs. Ongoing public information efforts include an article on POC root disease in the free Visitor Guides and backcountry information sheets, distribution of POC root disease informational brochures produced by the USFS, and inclusion of POC-related issues in regularly scheduled interpretive programs.

Actions Common To Alternatives 2 and 3 (common actions)

These actions involve enhanced public outreach and education, monitoring and GIS-based analysis of PL spread, incorporating POC protection measures into resource management and fire management planning, and evaluating all proposed projects in POC areas for the risk of spreading PL.

Enhanced Public Outreach

The objective of public outreach is to increase public awareness of POC root disease, why it needs to be

controlled, and how to reduce the spread to uninfested POC areas. The NPS would install signs at public use areas including campgrounds and trailheads, present interpretive programs to park visitors and in local communities, issue press releases, and distribute informational materials. Where practical, interpretive materials and outreach programs would be developed in coordination with the USFS public education efforts that are underway in Six Rivers National Forest, particularly in the Gasquet Ranger District and Smith River NRA that are immediately adjacent to RNSP lands.

Monitor Spread of PL in the Parks

To detect infected POC trees in high-risk areas, the NPS would develop and implement a monitoring program. NPS staff would survey high-risk areas annually and map any new infestation sites. GIS analyses would allow managers to look at disease spread patterns and rates to determine the effectiveness of control methods.

Incorporate POC Protection into Fire Management Planning

Little Bald Hills plant communities that have evolved in the presence of fire might benefit from the use of prescribed fire. In addition, the area is located adjacent to private and other public lands where uncontrolled wildfire could result in resource and property damage. The NPS would incorporate strategies and techniques into wildland and prescribed fire planning and operations to prevent spread of PL to uninfected areas. The NPS would develop and distribute a POC briefing package for use by fire management personnel on fire incidents. The briefing would describe POC concerns and would include materials such as maps identifying infested and uninfested watersheds and water sources and recommendations for cleaning equipment and treating water used for control and suppression efforts. Firefighter and public safety will outweigh POC management objectives in fire management actions and incidents.

Incorporate POC Protection into Park Project Planning

All park projects proposed in a POC area would be analyzed using a list of risk factors and a decision key (Appendix Two) to determine whether the project carries a reasonable potential to move PL spores into uninfested areas, either directly via running water, runoff, or root grafting, or indirectly by creating a reservoir for infestation that could easily be transported to other areas.

If a project is found to carry a reasonable risk of spreading PL, management practices described by Betlejewski (2004) would be recommended to mitigate this risk. If the risk cannot be appreciably reduced through practicable and cost-effective practices or design changes, the project would proceed if the value or need for the project outweighs the additional risk to POC. Wildfire suppression is an example of a situation where the need for immediate action might outweigh the additional risk of spreading PL.

Management practices would be designed to

- prevent or reduce the import of disease into uninfested areas, which occurs through offsite spores picked up and carried into an uninfested project area
- prevent or reduce the export of disease to uninfested areas, which occurs when onsite spores are moved offsite to an uninfested area
- minimize increases in the level of inoculum or minimize the rate of spread in areas where the disease is localized or the infestation is intermittent
- prevent the establishment of new infestation sites in high use areas that would likely serve as sources for further disease spread.

Recommended management practices include

- rescheduling the project to be done outside the wet season or a wet period
- redesigning a project to avoid POC areas
- using uninfested water for dust abatement or fire suppression

- designating ingress and egress routes to avoid infested POC areas
- ensuring equipment is free of mud or other materials that could be carrying the disease
- washing equipment including tools, vehicles, and footwear.

Trail Improvements and Temporary Trail Closures

Trails that pose a risk of spreading PL would be improved at wet areas and stream crossings to eliminate contact between trail users and infested mud or water, to reduce the risk that any PL spores are not imported or exported as a source of new infestation. Improvements include covering the trail surface with rocks, contructing bridges at stream crossings, elevating the trail surface above surrounding wet areas, and rerouting short segments of trails around wet areas. Trails that pass through newly discovered infestation sites that are determined to be a high risk site for spreading root disease would be closed temporarily during the wet season until the situation is assessed. At this time, only two trails are known to pass through infestation sites. The Hiouchi Trail is open year-round because it is located entirely within the main Smith River drainage that is already infested with PL. Improvements to the Hiouchi Trail are proposed under Alternative 2. The Little Bald Hills Trail is seasonally closed because it presents a high risk of spreading PL to an uninfested drainage. If part of the Little Bald Hills Trail is rerouted to avoid the infestation (Alternative 2), the trail would no longer be closed seasonally. The Mill Creek Trail does not pass through known infestations but is thought to be only other trail to have the potential to spread PL besides the Little Bald Hills and Hiouchi trails. The Mill Creek Trail will be monitored to determine if it becomes a higher risk for spreading PL.

Treatment of Social Trails

Social trails are unofficial unplanned trails created by park visitors to reach areas where there is no established trail access, or to take a short cut between segments of the established network of trails and roads. One known social trail near the Hiouchi Trail trailhead is used to access the Smith River. This trail may have been the route for the initial infestation near the north end of the Hiouchi Trail and has likely contributed to the spread of PL at this location. Social trails in close proximity to POC would be obliterated where human use would be easily curtailed. In locations where human use would be more difficult to manage or where people repeatedly ignore barriers to continually reestablish a social trail, these routes would be formalized by planning and constructing a trail to park standards and incorporating the construction techniques described under trail improvements. Social trails disturb soils and vegetation with no consideration of soil stability, drainage, or sensitive vegetation, and create bare areas which can lead to erosion of the trail and surrounding area, particularly on slopes. Since social trails are not a part of the official park trail network, they are not maintained and may go undetected for long periods. If a social trail cuts through a wet area or connects a PL-infested area with an uninfested area, the trail can contribute to the spread of PL before management actions can be implemented.

Alternative Two (Environmentally Preferred Alternative and Proposed Action) - Reroute Little Bald Hills Trail, Improve Hiouchi Trail, and Treat Small, Localized Infestations

Under the proposed action, part of the existing Little Bald Hills Trail would be rerouted to avoid the active infestation site along the current trail route. The Hiouchi Trail would be improved to reduce contact between trail users and potentially infested mud or water. Other trails that are found to have the potential to spread PL, including other areas along the Little Bald Hills Trail outside the reroute segment, would be improved at wet areas or other areas such as intermittent stream crossings that are potential sources of infestation. Where there are small, localized infestation sites, small POC would be removed or girdled to kill the trees to create an area where PL cannot infest any new host trees (localized sanitation). At this time, only the infestation site on the Hiouchi Trail (Figure 2, site 4) would be sanitized.

Little Bald Hills Trail Reroute

Under this alternative, a 3000-foot-long section of new trail would be constructed to bypass a 4200-foot-long section of the existing Little Bald Hills Trail that passes through a 20-acre PL infestation site and crosses several wet areas. Figures 3 and 4 show the proposed new alignment for the Little Bald Hills Trail. The new trail alignment would be uphill and at least 100 feet away from infested trees and would avoid wet areas. About 50 feet of each end of the abandoned trail segment would be scarified, replanted with native vegetation, and blocked with brush to discourage use. Native plants would be salvaged from the trail reroute and additional plant materials needed would be propagated from cuttings or seeds taken in the Little Bald Hills area. Upon completion of the Little Bald Hills Trail reroute, seasonal closure would be discontinued and the trail would remain open year round.

Work on the trail would be restricted to the dry season (June through October). Work would be postponed if rainstorms create wet conditions. The work would be subject to the project evaluation key in Appendix 2, and would incorporate all measures needed to avoid the spread of PL.

Crews and equipment would bypass the infestation site by accessing the trail along an uninfected route through the Mill Creek acquisition and traveling east to the trail reroute project site. An old logging road from the Mill Creek acquisition would be brushed and bladed in several places to remove deep ruts to allow passage of a small trail tractor. Crews would construct the reroute from the highest to lowest points to avoid traversing the infestation zone on the existing trail.

Hiouchi Trail Improvements

Small areas of the Hiouchi Trail (Figure 2, site 4) would be improved to reduce the risk of trail users contacting infested mud and transporting it between infested and uninfested POC stands. Trail improvements include improving drainage, re-routing or armoring the trail bed with crushed rock, elevating the trail surface above wet areas, or constructing raised crossings to prevent contact between trail users and water or infested mud. Drainage structures such as ditches along the trail or culverts at stream crossings would be improved or installed to ensure that runoff does not openly flow across or along trails. The trail surface would be armored with rock or other materials to minimize contact with mud and surface water. Raised crossings would be constructed at streams, seeps, or other wet places.

Similar improvement would be made to other trails where there is a moderate or high risk of trail users picking up or depositing disease-infested mud, such as small stream crossings, marshy areas or locations where seeps flow across or along the trail (actions common to alternatives 2 and 3). Currently, the Mill Creek Trail is thought to be the only other trail to have the potential to spread PL besides the Little Bald Hills and Hiouchi trails.

Remove Host POC trees in Localized, Active Infestation Centers (Localized Sanitation)

Under the proposed action, the infestation site at the Hiouchi Trail (Figure 2, site 4) would be treated by cutting or girdling both diseased and healthy live POC trees less than fifteen inches in diameter (dbh). Girdling kills the trees, which causes any PL spores to die. This action is termed localized sanitation to emphasize that it applies to a localized active infestation and to distinguish it from preventative sanitation (Alternative 3) where healthy POC would be removed to prevent future infestation even if no infestations or infected trees are thought to be present at the time of treatment. Localized sanitation is intended to stop infected trees in a small area from producing PL spores to reduce the risk of those trees serving as a source of spores that would continue to spread the disease.

Localized sanitation would be prescribed in sites that become infested if the following criteria are met:

- Trees are less than fifteen inches in diameter.
- The infestation covers less than five acres.
- Healthy trees have a high probability of being killed by the disease in the absence of treatment due to

their proximity to diseased trees. This distance is generally 25 to 50 feet, depending on crown characteristics, slope characteristics and drainage situation. Healthy POC trees that are more than 50 feet from an infected tree would not be removed.

- The infestation is upstream or upslope from a healthy population of POC near a trail, road or park facility and could be a potential source for further spread because of wet conditions conducive to spore movement.
- The infestation site borders or is close to a trail, road, or park facility that encourages human use and therefore increases the potential for spread of the disease. All POC would be removed within a distance two-and-one-half times the diameter of the crown of the largest infected tree.

The method of treating these trees would depend on their size. Trees less than six inches in diameter would be cut, limbed, and bucked and the debris placed in contact with the ground for faster decomposition. Cutting or girdling would be used on larger trees, depending on safety considerations. Some debris piles might be burned during the winter to reduce excessive fuel loadings that contribute to hazardous fuel build-ups. POC seedlings would be pulled by hand or using hand tools in the treated area for five to seven years as necessary.

Alternative Three- Preventative Trail and Road Side Sanitation Throughout POC Areas (Preventative Sanitation)

Under this alternative, all healthy and diseased POC within approximately 25 to 50 feet on either side of an estimated 7.8 miles of trails and unimproved roads in RNSP in the Smith River watershed would be removed or killed by girdling. Priority would be given to wet or muddy areas, or where surface water accumulates or flows across roads and trails. Sanitation would continue until no POC seedlings are found or until PL is no longer considered a threat to POC in the parks. An area is considered PL-free after POC have been absent from an area for seven years. Preventative sanitation would take longer than seven years from the time the treatment is begun to exhaust the POC seed bank, because POC seeds prolifically.

Preventative sanitation would reduce the number of potential disease host trees and prevent continued reinfection by spores already in the soil or newly brought into the area. Removing diseased trees reduces the spore load present in the soil adjacent to the trail or road, thus reducing PL spread potential. Removing healthy trees from the trail and road corridors prevents infected mud or soil, imported on vehicles or footwear, from contacting and possibly infecting other POC trees that would serve as hosts for spreading disease into new areas.

Preventative sanitation would involve eradication of all healthy and diseased POC trees within approximately 25 to 50 feet on either side of trails or unimproved dirt roads, and within approximately 50 feet from where a stream or watercourse crosses the trail or road. It is estimated that thousands of healthy POC trees of all sizes would be removed from trail and unimproved road corridors passing through POC areas along the Little Bald Hills Trail, Mill Creek Trail, and Hiouchi Trail, as well as several shorter connecting trails and dirt roads throughout Jedediah Smith Redwoods State Park within the POC vegetation types shown in Figure 2.

Dead trees would not be removed from the area because the spores die when the host tree dies. The method of treating these trees would depend on their size. POC seedlings would be pulled by hand or with hand tools. Trees less than six inches in diameter would be cut, limbed, and bucked and the debris placed in contact with the ground for faster decomposition. Cutting or girdling would be used on larger trees, depending on safety considerations. Some debris piles might be burned during the winter to reduce excessive fuel loadings that contribute to hazardous fuel build-ups.

The Little Bald Hills Trail would continue to be closed seasonally until the trail has been treated and the treated area has been free of host POC for seven years.

Alternatives Dismissed from Further Analysis

Permanent Closure and Abandonment of Trails

Under this alternative, all trails that pass near infected trees, including the Little Bald Hills Trail and the Hiouchi Trail, would be permanently closed and abandoned. Roads would not be closed and would continue to serve as a conduit for spreading PL. The sources of PL infestation would continue to exist and to threaten POC within the parks. This action was not considered further because it would not protect healthy POC trees and does not meet the parks' mission to provide visitor use and enjoyment.

Sanitation of All Infestation Sites

Under this alternative, all live POC trees within all disease-infested areas would be removed or killed with the objective of isolating and eventually eradicating the disease from all infestation sites in the parks (complete sanitation). The sanitation area would include a buffer of 25 to 50 feet surrounding each infestation site. Both healthy and diseased trees would be removed from the infestation site and the buffer zone whether the infestation is a single tree or covers a large area. This alternative requires continual removal of all live POC in the treated areas for at least seven years after the last POC seedling is removed.

This alternative requires removal of all live POC within all currently infested areas until POC have been absent for seven years, with the objective of eradicating the disease from the infestation sites by removing the hosts for spores. Sanitation of infested sites differs from localized (Alternative 2) or preventative sanitation (Alternative 3). Localized sanitation is the removal of trees less than 15 inches in diameter from small active infestations to prevent the infestation from spreading. Preventative sanitation is the removal of all sizes of live trees in uninfested areas that are at risk of infestation, with the objective of reducing the risk that disease spores may be imported into these uninfested areas. In preventative sanitation, no treatment is prescribed for infested areas where there is little risk of spreading the disease. Complete sanitation would require removal of all POC from large areas in an attempt to completely eradicate PL spores from infested areas.

In the Little Bald Hills, sanitation of infestation sites would require removal of thousands of healthy trees in all age and size classes on 25 acres within the Little Bald Hills infestation site. In RNSP along the Smith River corridor, hundreds of trees in all age and size classes would also be removed at current infestation sites. Each newly discovered infestation site would be similarly treated. PL transported from infested areas outside the parks, primarily from infested areas upstream along the Smith River, would continue to re-infect POC stands. This alternative would also contribute to fuel build-ups, increasing the fire hazard. This alternative would be considered an impairment of park resources because it would require complete and continued removal of a native species, some of which are resistant to the disease and which is considered an important component of several vegetation communities. Therefore, sanitation of all infestation sites was not considered a reasonable alternative and was not analyzed further.

AFFECTED ENVIRONMENT

Climate and Air Quality

The parks experience wet, mild winters and relatively dry summers with frequent coastal fog. Annual rainfall averages 70 inches, with most of it falling between November and March. Periodic extreme winter storms from the Pacific Ocean, often accompanied by strong winds, occasionally cause streams and rivers to flood. In the Little Bald Hills and Hiouchi, annual rainfall often exceeds 100 inches. Temperatures are moderate year round. Areas near the coast are frequently in the 43°F – 50°F range in the winter and the 65°F – 75°F range in summer. Inland areas tend to be cooler in the winter and hotter in the summer as they are more distant from the moderating influence of the Pacific Ocean. Coastal fog is a common climatic feature, occurring daily in the summer and frequently during the rest of the year. In summer, fog typically reaches inland as far as Hiouchi. The Little Bald Hills is inland of Hiouchi and generally above the fog zone.

Redwood National Park has been designated as a class I airshed pursuant to Part C of the Clean Air Act, as amended (42 U.S.C. 7401 et al.). State park lands within Redwood National and State Parks are classified as class II airsheds, with some areas being considered for reclassification to class I. Class I and class II designations are given to areas where air quality is cleaner than the national ambient air quality standards. Class I areas have the most stringent regulations for the protection of air quality, permitting the lowest increments of air quality degradation, whereas class II status allows moderate deterioration that might accompany well-planned growth. The California Air Resources Board has assigned the parks to the North Coast Air Basin, which is under the jurisdiction of the North Coast Unified Air Quality Management District.

Air quality in Redwood National and State Parks is considered good to excellent because of the low population, scarcity of pollutant sources, and prevailing westerly ocean winds. All federal standards are consistently achieved, including those for ozone, carbon monoxide, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. The most significant air pollutant in the parks is PM_{10} (particulate matter less than 10 micrometers in diameter), which is primarily from widespread non-industrial burning and the industrial burning of timber harvest slash piles. In the past, total suspended particulates exceeded air quality standards, but improved technology, better use of materials, and fewer sawmills (and especially their tepee burners) in the region have resulted in a reduction in suspended particulates. One industrial site along Humboldt Bay (50 miles south of the park) and one site in Arcata are the most serious point sources of pollution. Fog, rain, low clouds, salt spray haze, and natural forest haze inversion often impair local views and scenes.

Topography, Geology, and Soils

Topography

Elevations within RNSP range from below sea level in the offshore areas of the parks to 3,262 feet at an unnamed peak in the Coyote Creek watershed in lower Redwood Creek. Slopes range from near level in the alluvial valleys and on flood plains of the Smith River to near vertical along the coastal bluffs and within the inner gorge of stream canyons. Overall, slopes average 40% to 70%. In areas where POC occurs in the parks, elevations range from 2100 feet above sea level in the Little Bald Hills to about 100 feet at the Smith River near Walker Road. The topography is typical of Coast Range mountains, rising steeply from the coastal plain at Crescent City and cut by the Smith River into deep canyons. In the Little Bald Hills , the topography includes gently sloping areas as well as steeper hilly areas. The elevations along the Little Bald Hills Trail range from about 200 feet above sea level to 2100 feet, with grades of up to 35% and averaging 15%.

Geology

Redwood National and State Parks are primarily underlain by Mesozoic rocks of the Franciscan assemblage, a collection of sandstones, siltstones, schist and minor amounts of conglomerates with isolated exposures of chert and volcanic greenstones. There are also Plio-Pleistocene coastal plain sediments of the Prairie Creek Formation, tertiary marine deposits of the Wimer Formation and Mesosoic serpentine rocks in the Little Bald Hills area and Quaternary alluvial and marine deposits in stream valleys and coastal areas (Wagner and Saucedo, 1987).

The Franciscan assemblage is bounded on the west by the Cascadia subduction zone, which is several miles off the coast, and on the east by the South Fork Mountain fault. The South Fork Mountain fault runs east of the Redwood Creek basin and the parks except in the northeast corner in the Little Bald Hills area, where the fault comes through the parks.

Geologic structure in the parks is governed by several parallel north-northwest trending faults (Janda et. al., 1975; Harden et. al., 1982). These faults range from low-angle thrust faults to vertical faults and form the boundaries between the major lithologic units in the parks.

Smith River Geology

The portion of the Smith River watershed that is within the parks is made up of rocks from the Northern California Coast Range and the Western Klamath Mountains Province, separated by the South Fork Mountain Fault. The bedrock within the Coast Range Province west of the fault consists of Franciscan Broken Formation. These rocks are tectonically fragmented interbedded greywacke, shale and conglomerate (Blake and Jones, 1974). Highly sheared serpentinite and peridotite of the Klamath Mountains Province lie east of the fault (Madej, 1986). The Plio-Pleistocene Wimer Formation, consisting of estuarine and fluvial deposits, is preserved on flat topped ridges which are remnants of an erosion surface referred to as the Klamath Peneplain (Stone, 1992).

Soils

Soil development occurs in response to the weathering of the parent materials (rocks and alluvial deposits) and input from surface materials (vegetation), and varies depending on the topography, (slope, aspect, and hydrologic features), underlying rock composition, and time. For the most part, the soils in the parks are well developed because the mild wet climate has caused a high degree of weathering of the underlying materials. Residual soils are found in isolated areas on sloping ridge crests, and alluvial soils have formed in alluvial valleys, on floodplains, and on stream terraces.

Underlying geologic units strongly influence the nature of the soils, depending on their mineralogical and chemical composition and susceptibility to weathering and erosion. Most of the soils in the parks have developed from rocks of the Franciscan complex. Most of these soils have strongly developed surface horizons that are rich in organic matter and nutrients particularly in areas that (1) have coniferous forest, oak woodlands, and prairies, (2) are moderately coarse textured, and (3) have infiltration capacities but possess little cohesion and very low shear strength. The steep terrain, rainy climate, and deep, medium-textured soils make much of the parks very susceptible to erosion.

Soils formed from the serpentine rocks in the Smith River watershed differ in several respects from soils formed from the Franciscan complex, and are redder in color, richer in iron and clay, and contain a higher proportion of rock fragments; they are also relatively resistant to fluvial erosion. The calcium to magnesium ratio in these serpentine derived soils is very low, creating an unusual environment for plant life. Soils formed on the Wimer Formation are strongly acidic and likewise support a unusual assemblage of plants.

Water Resources

Rivers and Streams

There are approximately 21 mi (34 km) of perennial streams (including the main fork of the Smith River) and approximately 7 mi (11 km) of intermittent streams within the project area. The majority of POC occur in the watersheds of the Smith River and its tributaries Mill Creek, Cedar Creek, and Sheep Pen Creek. The Little Bald Hills Trail is located within the intermittent drainage areas of the Cedar Creek and Sheep Pen Creek watersheds. The section that would be bypassed is in the upper intermittent sections of the Cedar Creek drainage. The proposed reroute alignment is in an unnamed intermittent tributary of the Smith. The trail is about one-half mile from the point where Cedar Creek becomes a permanent stream. Hiouchi and the Hiouchi Trail are located in the watershed of the main stem of the Smith River and are immediately adjacent to the river at some point.

The Smith River is a component of both the federal and state Wild and Scenic River Systems. The section of the Smith through Jedediah Smith state park is designated recreational. Fishing, kayaking, and swimming during the warm summer months are popular recreational activities in the river in the project area.

For water quality purposes, the key beneficial water uses of the Smith River include recreation, fishing, cold freshwater habitat, wildlife habitat, municipal and domestic supply and agricultural supply. Beneficial uses have not been established for the tributary creeks. The primary responsibility for water quality protection and enhancement in California has been delegated to the California Water Resource Control Board. In northern California, the North Coast Regional Water Quality Control Board is responsible for adopting and implementing the *Water Quality Control Plan* for the North Coast Region. The plan specifies objectives, requirements, and implementation plans to protect the beneficial uses of water in the north coast area, including the parks. Water quality objectives in the plan do not allow any degradation of surface or groundwaters or permit any alteration of natural conditions. The plan also specifies the maximum contaminant levels for point (discharge from a discrete point) and non-point (dispersed runoff) sources.

Overall, the water quality in park streams meets or exceeds the water quality objectives established by the North Coast Regional Water Quality Control Board, except for Redwood Creek which is listed as sediment and temperature impaired according to Section 303(d) of the Clean Water Act. Redwood Creek is outside the natural range of POC. Most levels of chemical, biological, and physical indicators in surface and groundwater supplies within the park comply with primary and secondary water quality standards.

Floodplains and Wetlands

The Smith River meanders through a well-developed floodplain in Jedediah Smith state park. The Smith is the only major undammed river in California. The river experiences dramatic changes in flow during winter storms but in summer, it is a slow moving stream with deep holes alternating with cobble bars and is suitable for swimming. When flows reach less than 300 cubic feet per second, which usually occurs sometime in late summer, the California Department of Fish and Game closes the river to sport fishing. Cedar and Sheep Pen creeks drain steep slopes as they approach the river and have poorly developed floodplains. Mill Creek is a larger stream with a floodplain that support riparian vegetation. The wetlands in the project areas are generally narrow riparian zones adjacent to the river and creeks. The steep topography does not facilitate the presence of wetlands in the project area, although there are small wet areas and seeps.

Vegetation

Park vegetation types vary and reflect differences in topographic relief, soils, aspect, climate, disturbance regime, and use. Forests are the predominant vegetation type in the parks, with grasslands/woodlands, shrub lands, coastal dune mat, and wetland/riparian communities. Port-Orford-cedar occurs naturally in old-growth redwood,

Jeffrey pine, knobcone pine, and second-growth redwood forests, and fescue grasslands and chaparral. A more in-depth discussion on vegetation types with POC follows. Scientific names for species mentioned in the text are found in Appendix 3.

Redwood Forests

Old-growth redwood forests occupy about 8,000 acres in the Smith River area of Redwood National and State Parks. These redwood forests are dominated by coast redwood and Douglas-fir. Associated species vary according to differences in physical characteristics of the site such as slope position (upland, or alluvial floodplain), proximity to a stream (riparian), and distance to the ocean. Other coniferous trees found include grand fir, Sitka spruce in lowland and coastal areas, and western hemlock in moist lowland to upland habitats. In stream corridors and near the Little Bald Hills, Port-Orford-cedar is present as a component of the overstory vegetation. Port-Orford-cedar becomes more dominant near the Little Bald Hills where soil characteristics (serpentine) do not favor redwoods.

Conifers in redwood forests are generally taller and more abundant than hardwood species but occasionally hardwoods dominate a stand. Major hardwoods are tanoak, madrone, big leaf maple, California bay laurel (also known as myrtlewood or pepperwood), and red alder. Except for madrone, all these hardwoods occur in both riparian and upland areas and are subdominant or a minor component in the stand.

Moist lower slopes have the lushest understory found in redwood forest communities. This community is found in the Stout Grove area and along parts of Howland Hill Road. The dominant understory species of the redwood forest are redwood sorrel and sword fern.. Other common understory plants are rhododendron, huckleberry, salal, western azalea, and several types of berry. Evergreen shrubs such as salal, rhododendron, and huckleberry characterize the middle and upper slope positions.

Ultramafic Vegetation Types

These vegetation types survive and even thrive on ultramafic serpentine soils that have high concentrations of heavy metals that are toxic to most plants, few nutrients available for plants because of high pH, and poor water holding capacity. These vegetation types are found primarily in the Little Bald Hills area of RNSP.

Dry forests in the northern part of the parks include tanoak/POC forest, Jeffrey pine-Idaho fescue woodland, chaparral, and knobcone pine forests.

The tanoak/POC forest is found in the Little Bald Hills just upslope from the redwood forest, on serpentinite-derived soils. The vegetation is dominated by POC, Douglas-fir, and tanoak. Evergreen huckleberry, red huckleberry, and western azalea dominate the shrub understory. These forests can be found on the middle to lower slopes of the Little Bald Hills and occur as the western extension of a dominant vegetation type found more commonly on private lands and Forest Service lands to the east. Pure Douglas-fir stands can also be found closer to the higher elevations of the Little Bald Hills encroaching into the Jeffrey pine woodland near the ridge tops.

The Jeffrey pine/Idaho fescue grassland, chaparral, and knobcone pine vegetation types are grouped here because they are localized in about 1,300 acres of the Little Bald Hills. Despite almost 100 inches of annual precipitation, the vegetation in these communities is sparse due to serpentine soil chemistry and poor water holding capacity. These harsh growing conditions have resulted in the development of specialized plant communities with many unique plant species.

The driest ridge tops are occupied by widely scattered Jeffrey pine within the matrix of Idaho fescue grassland. Many of the parks' unique and uncommon herbaceous species grow within the fescue grassland. The chaparral occurs down slope and grows on soils derived from marine sediments. Members of the heath and oak families such as manzanita,, rhododendron, salal, huckleberry oak, golden chinquapin, and shrubby tanoak dominate the

chaparral communities. Knobcone pine stands are found interspersed within both these vegetation types. Port-Orford-cedar is occasionally found growing in headwater swales of drainages flowing from the Little Bald Hills.

The knobcone pine forest is comprised of dense stands of small-diameter, mostly even-aged trees. Knobcone pine may be restricted to serpentine soils and is subject to frequent fires because of its association with other fire-dependent vegetation, xeric growing conditions, and heavy fuel accumulations attributable to early senescence. Knobcone is a successional stage that in the absence of fire gives way to Douglas-fir, madrone, and tanoak. Examination of fire scars and post-fire regeneration patterns suggest that the last known fire in the knobcone pine vegetation type was about 1940.

The serpentine soils and shade associated with POC sites in the Little Bald Hills make invasive exotic species less of a problem than in other areas of the parks. Certain shade-intolerant species can vector along trails, taking advantage of the increased light. Invasive non-native plants within the action area include French broom, Scotch broom, Klamathweed (St. John's wort), English ivy, cotoneaster, silver wattle, tansy ragwort, and Himalayaberry.

Second-growth forests

Second-growth forests are those that have been logged at least once. They are commonly encountered throughout the parks, but are more contiguous and expansive in the southern drainages, including Prairie Creek and Redwood Creek. Approximately 50,000 acres of second-growth occur in the parks. The western part of Howland Hill Road and portions of the Little Bald Hills Trail in the national park passes through second growth redwood forest (Figure 2).

These forests are a mixed assemblage of species reflective of the regeneration method utilized after harvest of the old-growth forest. Naturally regenerated second-growth stands can be dominated by alder in moist habitats, spruce/redwood in more coastal sites, and tanoak on dry inland ridges. Redwood is the common associate to all three types, most abundant in the alder dominated stands and least abundant in the tanoak-dominated stands. Second-growth stands that were artificially seeded after harvest tend to be dominated by Douglas-fir and tanoak. The seed mix utilized for regeneration often included species that are exotic to the particular locations in which they were used including Sitka spruce in non-coastal sites, a hybrid pine (Monterey X knobcone), and Port-Orford-cedar. The cedars are a minor component of these stands, are often stressed by the growing conditions, and are considered an exotic species in the parks' vegetation communities.

Fire And Fuels Management

Fire is managed in RNSP where fire serves an ecological role in vegetation community structure, to enhance native plants and vegetation communities that have evolved with fire, to reduce populations of invasive exotic plant species, to maintain cultural landscapes, and to protect human life and property Within the range of naturally occurring Port-Orford-cedar, there are three distinct areas where fire is managed to achieve these goals: the Little Bald Hills , Jedediah Smith Redwoods State Park, and the Hiouchi area of the parks adjacent to the community of Hiouchi.

Little Bald Hills

Vegetation in the Little Bald Hills is described previously in the Dry Forest section. The Jeffrey pine and knobcone pine vegetation types do not support a sizeable population of Port-Orford-cedar, although the cedar does occasionally occur near headwater swales in adjacent Jeffrey pine woodlands. Vegetation types and composition indicate that past periodic burning has influenced these communities. Given the length of time since the last known fire in 1940, it is likely that vegetation patterns and fuel loadings have increased available fuels so that wildfires are expected to burn more intensely in these vegetation communities Six Rivers National Forest lands to the east and down slope of the Little Bald Hills tend to be drier and hotter than park lands to the west,

where the vegetation grades into moist coniferous forest and is subject to cooling summer fogs. The potential for fire to burn into the Little Bald Hills from the east is high. The predominant management strategy for the entire 1300-acre Little Bald Hills is to suppress all wildfires. Suppression strategies in place include restrictions on bulldozer or tractor use for fire-line construction. The Mill Creek property recently acquired by the CDPR to the south and west of the Little Bald Hills would be used as an access route for wildfire suppression.

Jedediah Smith Redwoods State Park

The state park covers approximately 9,000 acres, primarily composed of upland old-growth redwood forests with several excellent examples of redwood dominated alluvial terraces adjacent to the Smith River. Mill Creek and Cedar Creek, which enter the Smith River from the south and flow under Howland Hill Road and U.S. 199, respectively, contain Port-Orford-cedar stands through the riparian corridor. Port-Orford-cedar can also be found growing along the main Smith River corridor. The park is bordered on the east by private land and Six Rivers National Forest and Crescent City to the west. All wildland fires in the state park are suppressed.

The last known fire occurred in the area during the autumn of 1936 within the old-growth forest northwest of the Howland Hill Road near the Nickerson Ranch site. Frequent fire ignitions east of the park are thought to have increased fire frequency in the state park prior to the settlement period. As in the Little Bald Hills , there has been enough time since the last known fire for available fuels to increase, with a corresponding increase in the potential for higher intensity fires.

Hiouchi

This 40-acre area in the national park is bounded by Jedediah Smith Redwoods State Park on the west and south and U.S. Forest Service and private lands on the north and east. The unit lies on an old river terrace on the north side of the Smith River. While the unit is dominated by invasive exotic herbaceous and shrub species, Port-Orford-cedar does occur in very isolated patches. The fire management strategy for this unit is complete suppression to protect human life and property, and keep any wildfires from moving out of the park into private or USFS lands. The NPS has begun managing dense fuels along the eastern edge (park boundary) of the unit adjacent to the community of Hiouchi through thinning and pile burning during the winter months. The fire history of the unit is unknown.

Fish and Wildlife

The lower reaches of the Smith River and its tributaries occur within Jedediah Smith Redwoods State Park and adjacent National Park Service land. Within this area there are approximately 21 miles of perennial streams, including the main fork of the Smith River, and approximately seven miles of intermittent streams. Port-Orford-cedar is a component of the riparian habitat along many of these streams. Because POC is not the dominant conifer along the streams and the river in this reach, it does not contribute substantial amounts of large woody debris and shading. Even where there may be heavy POC mortality along the river, other conifers can provide the large woody debris and shading needed for good quality fish habitat.

Anadromous fish species found in this area include coho salmon, chinook salmon, coastal cutthroat trout, and steelhead trout. Resident rainbow trout (the non-anadromous form of steelhead) also occur in this watershed. Of these species occurring in the Smith River and its tributaries, only the coho Evolutionarily Significant Unit (ESU) is federally listed and is discussed under threatened and endangered species in the next section.

Old-growth redwood and second-growth Douglas-fir/tanoak forests dominate wildlife habitat in the affected area. Other vegetation types create a mosaic of habitats in the vicinity of the Little Bald Hills including Jeffrey pine-Idaho fescue woodland, chaparral and knobcone pine forest. Port-Orford-cedar is a component in all of these vegetation types. Altogether there are approximately 8,625 acres of old-growth habitat in the project area suitable for use by wildlife dependent upon late-successional forests. There are approximately 346 acres of Jeffrey pine-

woodlands and chaparral preferred by wildlife associated with more open habitats.

Little or no research or systematic inventory of streams or riparian habitat used by amphibians has been done in the project area. There have been incidental observations of red-legged frogs (*Rana aurora aurora*), foothill yellow-legged frogs, southern seep salamanders, Pacific giant salamanders, and aquatic garter snakes by park biologists and other knowledgeable observers. Other stream dwelling amphibians such as the tailed frog and rough-skinned newt are expected to occur in suitable habitat.

A wide variety of large and small mammals, birds associated with closed canopy forests and open country habitats, and terrestrial reptiles occur in the project area. Western pond turtles are likely to be found in the Smith River.

Rare, Threatened, and Endangered Species

Plants

One federally listed plant, beach layia, occurs on one of the southern beaches of Redwood National and State Parks but does not occur anywhere within the range of POC in the parks. The Western lily and McDonald's rock cress, are also federally listed an endangered but neither plant has been found in the parks, and neither species occurs in the habitats where POC is present. The serpentine areas in RNSP (Pacamo property and Little Bald Hills) have been surveyed for rare or sensitive plants incidental to other resource management or development projects. These surveys have noted the occurrence of plant species designated by the California Native Plant Society (CNPS) as being rare in California or throughout the species' range. CNPS-listed plant species occurring in POC habitat include maple leaved checker-bloom, Butte morning glory, Indian pipe, paintbrush, and Bolander's senecio.

Wildlife and Fish

One butterfly, one fish, two birds, and one mammal that are listed or candidates for listing under the federal Endangered Species Act (ESA) occur in the project area. The Mardon skipper butterfly and the fisher, a medium-sized furbearing carnivore, are candidates for listing. Coho salmon, northern spotted owls, and marbled murrelets are all federally listed as threatened species.

Coho salmon

The southern Oregon and northern California evolutionarily significant unit (ESU) of coho salmon is listed as threatened under the federal ESA. This ESU includes coho found in the Smith River and its tributaries.

In southern Oregon and northern California, NOAA Fisheries has designated critical habitat for this ESU between Cape Blanco, Oregon and Punta Gorda, California. The designation of critical habitat identifies areas essential to the conservation of the species.

The critical habitat unit (CHU) for coho is all stream and estuarine reaches accessible to the species and includes water, substrate, and the adjacent riparian zone. Accessible reaches are those within the historic range of the ESU that can still be occupied by any life stage of coho. The adjacent riparian zone is the area that provides shade, sediment transport, nutrient or chemical regulation, stream bank stability, and input of large woody debris or organic matter. Habitat quality in this zone is related to the quality of riparian areas, upland areas, inaccessible reaches, intermittent streams, or headwaters that provide key habitat elements such as large woody debris and gravel that are crucial for coho in downstream reaches (USDC 1999). Thus, the width of the riparian zone included as critical habitat is variable depending upon consideration of these factors.

Northern Spotted Owl
The northern spotted owl is federally listed as threatened. The 1999 RNSP General Management Plan/General Plan Environmental Impact Statement/Report defined suitable spotted owl nesting and roosting habitat as old-growth forested stands with canopy closures of more than 70%, with at least 40% of the canopy contributed by trees larger than 21 inches diamter Stands with conifers greater than 18 inches diameter or with less than 40% overstory canopy may be suitable if large hardwoods fill in the canopy to 60% total closure. Second-growth stands logged more than 40 years ago are considered suitable habitat, especially if large residual trees occur in the stand.

In the original inventory of spotted owl habitat in RNSP spotted owls were found roosting in old-growth forests more often than expected, and second-growth less often than expected, when compared to the proportional availability of these cover types (Tanner 1999). Spotted owl roost sites also were shown to have greater structural complexity and a higher basal area of old-growth redwood relative to random sites. Spotted owls in RNSP have used cavities, platforms on tree limbs, tree deformities, and other animal nests for nesting (Tanner 1999).

Within the affected environment, all of the old-growth forest acres are considered suitable for spotted owl nesting, roosting, and foraging. An additional 773 acres of second-growth forest also have the potential to be suitable nesting, roosting, and foraging habitat.

Much of the suitable nesting and roosting habitat in Jedediah Smith Redwoods State Park and the Little Bald Hills has been, or is in the process of being, surveyed for spotted owls. To date, only one spotted owl territory has been documented within this area. That territory's activity center was located within 1.3 miles of two known Port-Orford-cedar infestation sites, but spotted owls have not been detected in that territory since 1995. A reproductive pair of barred owls occupied the spotted owl pair's core area in 2002. Barred owl persistence at this site probably precludes reoccupation by spotted owls (Kelly et al. 2003).

Marbled Murrelet
Marbled murrelets are listed as threatened under the federal ESA and as endangered by the State of California. These robin-sized birds feed over the open ocean but nest primarily in large conifer trees located within 35 miles of the coast (USDI 1992). Nesting habitat characteristics include trees with large moss-covered limbs, plus tree and forest canopies that provide adequate canopy cover over the nest (USDI 1996). Nests are not constructed by the birds but are located on large diameter branches (e.g., with average size of 13 inches), forked branches, dwarf mistletoe infestations (e.g. witches' brooms), or other structures large enough to provide a platform.

Numerous marbled murrelet surveys, including monitoring and research projects, have taken place or are on-going in RNSP. An initial state-wide inventory of potentially suitable marbled murrelet nesting habitat was conducted in 1988 by Ralph et al. (1990). During this inventory marbled murrelets were detected at numerous survey stations throughout the park, including Jedediah Smith Redwoods State Park. Another study, conducted from 2001 through 2003, attempted to assess the relationship between marbled murrelet nesting success and proximity to park trails and highways, and to measure behavioral responses of adults and chicks at the nest during noise disturbance events caused by trail users and maintenance activities. Five and 19 nests were located in the first and second years of this study, respectively (Hebert and Golightly 2003). All were in the Redwood Creek watershed. Because of these and other studies within RNSP, it is assumed that all stands with trees providing nesting opportunities for marbled murrelets have the potential to be occupied.

Marbled Murrelet Critical Habitat–Jedediah Smith Redwoods State Park was designated as a CHU for marbled murrelets along with Del Norte Coast Redwoods State Park (marbled murrelet CHU CA-02-a). Within Jedediah Smith Redwoods State Park there are approximately 9,480 acres that meet the criteria of designated critical habitat.

The U.S. Fish and Wildlife Service (USFWS) has determined that the physical and biological habitat features (termed "primary constituent elements") associated with the terrestrial environment that support nesting, roosting, and other normal behaviors are essential to the conservation of the species and require special management considerations. For successful murrelet nesting, the USFWS focuses on the following primary constituent elements:

1) Individual trees with potential nesting platforms;
2) Forested areas within 0.5 mile of individual trees with potential nesting platforms, and with a forested canopy height of at least one-half the site-potential tree height.

This includes all such forest, regardless of contiguity. These primary constituent elements essentially provide and support suitable nesting habitat for successful reproduction of the marbled murrelet. Within the boundaries of designated critical habitat units, only those areas that contain one or more primary constituent elements are, by definition, critical habitat (USDI 1996).

Mardon Skipper

The mardon skipper (*Polites mardon*), a small sedentary butterfly that is a candidate for listing under the federal ESA, inhabits low growing grassland plant communities. Until recently, the species was known from four widely separated locations. The only known California population occurred in northwestern Del Norte County, on Low Divide ridge in Six Rivers National Forest north of the parks. In May 2004, a fifth population was discovered in the Little Bald Hills area of the park. This is now the southernmost known population. Both California populations occur in rocky serpentine meadows containing Idaho fescue. The two California sites are separated by approximately seven air miles, and the Smith River canyon.

Mardon skipper larvae feed on fescue for approximately three months (Dornfeld 1980) before pupating in cocoons in the bunch grass (Newcomer 1966). Adults feed on a variety of nectar sources depending on the locale. At one site *Viola adunca* was the preferred nectar source; other preferred sources include vetch, penstemon, and mariposa lilies. Site conditions where mardon skippers have been found range from dry, open ridge tops to places associated with wetlands or riparian habitats.

The May 2004 survey located a population of mardon skippers in a mesic fescue-dominated meadow and a tall-grass horse pasture. An additional search for mardon skippers in early June 2004 resulted in a few individuals being detected in ridge top areas, approximately 0.5 miles southeast of the original location. There are approximately 346 acres of potentially suitable mardon skipper habitat in the Little Bald Hills, approximately four acres of which are within 0.5 mile of the known PL infestation on the Little Bald Hills Trail.

Fisher

The fisher, a medium-sized fur-bearing forest carnivore in the weasel family, is a candidate for listing under the federal ESA. Fishers inhabit late-successional forest habitat. Habitat loss, coupled with overtrapping in the 1940s and 1950s, has resulted in the fisher being extirpated or becoming uncommon over much of its historic range in the Pacific states (Aubry and Lewis 2003, Powell and Zielinski 1994). However, in Del Norte and Humboldt counties, fisher populations are consistent with their historic distribution (Zielinski et al. 1995). The fisher population in northwest California is probably the largest in the western United States, although it is isolated from other populations (Aubry and Lewis 2003).

To date there have been four separate surveys for forest carnivores in RNSP. Fishers were detected in all four of these surveys; at least one of these surveys detected fishers in and around Jedediah Smith Redwoods State Park. These surveys plus reliable fisher observation records in the park's wildlife observations database, indicate that the species is probably well-distributed throughout RNSP.

Fishers have large home ranges and require large structures well-distributed throughout the home range for denning and resting. Within the affected area, all of the old growth forest acres are assumed to provide suitable fisher denning, resting, and foraging habitat. An additional 773 acres of second-growth forest also have the potential to be suitable habitat for the fisher.

Cultural Resources

Cultural resources for the purposes of this document are defined as archeological resources, historic resources, ethnographic resources, and cultural landscapes that are eligible for or are listed on the National Register of Historic Places (NRHP) and as defined in Section 106 of the National Historic Preservation Act (NHPA). Such resources in the NHPA are called historic properties.

Evidence of prehistoric human activities in RNSP includes village sites, seasonal camps, and trail use sites reflected in the archeological record by artifact concentrations and associated features found in the Bald Hills prairies, along the coast, and in some instances within forested areas in the Redwood Creek basin and other perennial drainages, as well as by the stories that have been passed down generation to generation by the Yurok, Tolowa, and Chilula People. Historic-period activities within what is now RNSP have included exploration, cattle and sheep ranching, dairies, farming, logging, mining, and establishment of overland transportation routes.

Lands containing Port-Orford-cedar in RNSP are primarily located within the ancestral territory of the Tolowa people.

Two tribal governments, the Smith River Rancheria and Elk Valley Rancheria, serve contemporary American Indians who have traditional ties to the management plan area. Park staff work with tribal governments and other local American Indians on a variety of issues affecting local Indians including management of cultural resources, access to and use of traditional lands and resources, interpretation of American Indian culture and lifeways, and employment.

Consultation with federally recognized tribes is conducted on a government-to-government basis for any park project that might affect areas of concern to tribes.

The proposed actions in this plan that might affect cultural resources include the areas along the banks of the Smith River and areas along the former Kelsey Trail.

Ethnographic Resources

Local American Indians have ties to many locations throughout the parks, and numerous sacred and ceremonial sites continue in use today. Many sites of ethnographic significance within the parks are the locations of traditional uses, particularly the gathering of plant materials for food, for making baskets, for medicine, and for ceremonies.

An initial inventory of resources of ethnographic significance and traditional cultural properties in RNSP is currently in progress. Although none of these resources are currently listed on the NRHP, a number of these resources are in all likelihood eligible for listing.

Consultation with the Smith River Rancheria Culture Committee resulted in the identification of a blue clay source used ceremonially within the vicinity of the Little Bald Hills Trail and the proposed re-route. The exact location of this blue clay source is still unknown.

Typically the NPS will address areas of ethnographic significance to tribes under the Secretary of the Interior's Standards for traditional cultural properties. The Park service works together with tribes to identify and then protect to the extent possible resources of ethnographic significance to the Tolowa people.

Archeological Resources

The archeological resources of RNSP include prehistoric and historic sites, trails, ceremonial and sacred sites, and gathering and village sites. Many of these sites have associated significance for contemporary Indians who have traditional ties to RNSP lands.

Within the plan area, six archeological sites are located in areas where POC occurs. Site location information is protected by law therefore this information will not be disclosed. These include the following: a cemetery, an ethnographically significant rock outcrop, possible burial location of Chief Phillips, two Tolowa village sites, and a prehistoric midden deposit, which are the remains of daily activity at a particular location.

In addition there are five additional archeological sites located adjacent to areas where POC occurs. These include the following: a small Tolowa village site that was occupied into historic times, the remains of the former Murphy's Ranch, and two sparse scatters of flaked stone representative of stone tool making activities. The remains of Murphy's Ranch are near but not located within the APE of the POC plan. No POC occurs at the Murphy's Ranch or vicinity.

None of the sites in the state parks have been evaluated for listing on the National Register but are considered to be eligible for listing until determined otherwise, and are protected accordingly.

Historic Resources

Historic resources in RNSP include sites, roads, trails, buildings, structures, and cultural landscapes. Historic resources in the vicinity of proposed trails, trailheads, and backcountry camps include historic roads and trails, segments of the Old Redwood Highway, and historic sites and structures associated with ranches, mining, logging and military operations. Some historic trails and roads have been incorporated into current trails, including the Coastal Trail and the Little Bald Hills trail.

Portions of the historic Kelsey Trail are likely to be eligible for the NRHP. No other cultural resources that have been listed or determined eligible for listing on the NRHP would be affected by actions proposed in this plan.

Cultural Landscapes

Cultural landscapes reflect human adaptation and use of natural resources expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures built. The character of a cultural landscape is defined by both physical materials such as roads, buildings, and vegetation, and by use reflecting cultural values and traditions. An initial cultural landscape inventory for RNSP was completed in 1997. According to the inventory, RNSP contains at least eleven cultural landscapes that are potentially eligible for listing on the National Register. One of these, the historic Kelsey Trail, is in the vicinity of the project areas.

The Kelsey Trail was constructed in 1855 and used for approximately 25 years to supply the interior mining camps of Del Norte and Siskiyou counties with supplies brought by wagon and pack train from Crescent City (Evanow 1980). The road from Crescent City to Big Flat was constructed under contract to Mssrs. Tucker, Collier, and McPhee of Crescent City. Ben Kelsey constructed the section from Yreka to Klamath. In some places, wagon wheel ruts are clearly visible. It is very likely, that this route was also used by Native Americans long before the occupation of the area by Euroamericans. The Kelsey Trail has been identified as a cultural landscape on the NPS Cultural Landscape Inventory.

Visitor Use And Experience

Roads, Trails, and Campgrounds

The total maintained road system within the parks consists of about 28 miles of major paved roads, 25 miles of minor paved roads, and 25 miles of gravel roads. The California Department of Transportation (Caltrans) is responsible for the operation and maintenance of the state and federal highways that pass through the parks (U.S. 101 and U.S.199).

In addition to the main highways, circulation in the parks in the project area is on several small, internal, maintained roads (both paved and unpaved). Some of these roads are dead-ends.

Howland Hill Road
Howland Hill Road is a narrow, two-way 8-mile-long unpaved road that winds through the old-growth redwood forest in Jedediah Smith Redwoods State Park and through second growth forest in the national park. Howland Hill Road is also important to local traffic and periodically serves as an alternate route for U.S. 199 traffic when the highway is closed due to road maintenance west of Hiouchi or landslides. The road runs from the outskirts of Crescent City through the Douglas Park subdivision, where it becomes Douglas Park Road, connecting with South Fork Road, which joins U.S. 199 east of the park. South Fork Road is not a through road. South Fork Road is a county road that runs along the South Fork of the Smith River and provides access to two small residential areas along the river and to Six River National Forest lands beyond. Howland Hill Road provides vehicle access to the parking area at Stout Grove, an area that is within the Smith River corridor and supports Port-Orford-cedar. Howland Hill Road is an attraction unto itself because it passes through old growth forest as a slow-speed scenic route. Howland Hills Road is adjacent to or crosses riparian corridors containing Port-Orford-cedar.

Walker Road
Walker Road is a narrow, unpaved, one-lane, dead-end road connecting to U.S. 199 south and west of the Smith River. It crosses Clarks Creek and traverses north to the Smith River for several miles before ending at the park boundary with Green Diamond Resource Company (formerly Simpson Timber) lands. Port-Orford-cedar is found on Clarks Creek, downstream of the road crossing, in an old-growth dominated stand along the Smith River flood plain. Trailers and motor homes are discouraged from using this road.

Smith River Corridor Trails
The trails in this area that pass through mapped vegetation types mapped as containing POC include Hiouchi, Wellman, Simpson-Reed/Peterson, Nature, Campground, Mill Creek, and River trails. The density of POC along these trails varies and in many cases is sparse and scattered. These trails and associated spurs serve to provide visitors with access to the Smith River and old-growth forests such as Stout Grove, day use facilities within Jedediah Smith campground, and interior old-growth forests via the Mill Creek trail. Although no statistics are available for quantifying visitor use on these trails, the numbers of annual visitors checking in at the Hiouchi Information Center are available. In 2003, there were 24,892 visitor contacts. Over the last 10 years, an average of 35,377 visitor contacts were made annually at the information center. These numbers can serve as proxy values for determining relative use of the Smith River area and associated trails by visitors. Within the Smith River corridor, there is one known trailside infestation on the Hiouchi Trail (Figure 2, site 4).

Little Bald Hills Trail
The trail through the Little Bald Hills is a combination hiking-equestrian trail that gives visitors the opportunity to see the vegetation types and habitats that are found in the Little Bald Hills. The trail in RNSP begins at a trailhead off Howland Hill Road near Stout Grove, crosses the RNSP boundary near the top of the ridge in the Little Bald Hills, and continues southeast down into Six Rivers National Forest to the Paradise Trailhead off South Fork Road along the South Fork of the Smith River. The highest point of the Little Bald Hills Trail at the

boundary between the parks and the national forest commands sweeping vistas in all directions, with spectacular views of the Siskiyou Mountains to the east and coastal forests to the west. The dry open woodlands interspersed with grasses and large pine trees in the upper elevations of the Little Bald Hills are unique in RNSP. There is one known PL infestation site along the Little Bald Hills Trail.

A primitive hiking/equestrian campground is situated near the top of the Little Bald Hills . Campground visitation statistics based on camping permits issued show a high degree of variation in the number of campers using the facility over the past ten years. In 2003, permits were issued for 25 campers. Peak usage occurred in 1999 and 2000 with 142 and 103 camping permits issued.

Jedediah Smith Redwoods State Park Campground
A paved one-lane road network provides internal circulation within the campground and day use area on the river, and is also used for administrative access. The campground is reached from US 199 west of the community of Hiouchi. The campground and day use area are located on a river terrace within the floodplain of the Smith River. Within the campground are isolated pockets of Port-Orford-cedar. Near the day use facility there is a possible PL infestation site. This road system is heavily used during the summer months. The campground portions are generally closed during the rainy season because of low park visitation but the day-use area remains open and is used by sport fishermen.

The campground in Jedediah Smith Redwoods State Park is one of the most popular in the State Park system with many visitors returning year after year. Situated on the banks of the Smith River, it is a perennial favorite with park visitors. The campground has 141 campsites that are full on a daily basis during the peak season. The campground also maintains a day use facility to serve more transient visitors wishing to access the river and forests for swimming, hiking, and fishing. It is estimated that a minimum of 93,000 people visited the campground for day or overnight use from June 2003 to June 2004. There is one possible PL infestation site within this campground.

Scenic Resources

The GMP identified five distinct landscape units in the parks that provide the visual resources most responsible for visitor inspiration and wonder. Old-growth redwood forest and the Smith River are identified as two of the primary landscapes. The Smith River is famous for its clear emerald-green water. The Little Bald Hills Trail winds through dense, coniferous forest before reaching the more open Jeffrey pine woodland and sweeping vistas at the highest point on the trail.

Park Operations

Park operations that take place within the range of native POC include maintenance of roads, trails, and visitor and administrative facilities, management of natural and cultural resources including surveys for biological and cultural resources and control of invasive exotic plants, fire management, interpretive and educational activities, and law enforcement and resource and visitor protection actions. Trail and road maintenance activities occur on a rotating basis throughout the area. Activities include brushing trailside vegetation, maintaining paved roads, grading dirt roads, maintaining one developed and one primitive campground, and improving trails as needed. A maintenance shop is located in the developed campground to facilitate these functions. Fire management activities include suppression of all unplanned ignitions and possible use of limited prescribed burning in the Little Bald Hills. Fuel management activities may occur in boundary areas adjacent the town of Hiouchi. A park-operated fire station is located next to the Hiouchi Information Center. Resource management activities include inventorying and monitoring of biological species and ecological processes and functions, and exotic plant management activities. Researchers outside of RNSP conduct scientific research on an intermittent basis. Interpretive functions include trail walks, campfire programs, operation of the Howland Hill Outdoor School, and

kayak trips down the Smith River. Law enforcement activities include incidental patrol of all areas within the parks as part of normal duties or directed actions relevant to law enforcement investigations, which include driving and/or hiking as needed.

ENVIRONMENTAL CONSEQUENCES

This section describes and analyzes the impacts and effects of the proposed actions and the alternatives, including the no action alternative, on park resources and values, visitor use and experience, and park operations and adjacent communities. The analyses of environmental impacts are considered in terms of context, intensity, duration, and type of impact. Impacts on a particular resource are predicted based on impacts known from similar projects, relevant scientific research and publications, and best professional judgment of park specialists familiar with the resources.

The context of an impact includes consideration of the local and regional conditions. POC occurs over a much larger area than its range within RNSP. The context of a park action includes consideration of the effects on POC within and immediately outside the parks, and throughout the range of POC in northern California and southwestern Oregon. The timing of an impact is also part of its context. For example, closing a popular trail during the winter rainy season when there are few visitors in the parks has much less effect on visitors than closing the same trail during the peak summer visitor season. Brushing vegetation along a road in September does not affect nesting birds but brushing the same road in June would affect any birds that might be nesting in the vegetation. Cumulative impacts are considered in the spatial context of park, local, and regional POC populations.

The duration of an impact considers the length of time over which the impact occurs. Impacts are defined as short-term or long-term, although the time period depends to some extent on the resource affected. Short-term effects on vegetation would generally be on the order of a year or less, because a year includes one complete growing season. Long-term effects would be those that are repeated over at least several years. In the context of long-lived species such as POC trees or for plant communities, long-term effects might either persist, or be unnoticeable, for decades or centuries.

The type of impact is defined as whether an action would be beneficial or adverse to a resource. Beneficial effects improve resource conditions or are favorable. Adverse effects are those that damage a resource or are unfavorable to the conservation and preservation of the resource. For some resources, notably endangered species and cultural resources, the term adverse has a specific meaning that is defined by regulations for implementing the Endangered Species Act of 1973, as amended, or the National Historic Preservation Act of 1966, as amended. This impact analysis attempts to compare effects on endangered species and cultural resources using terminology consistent with descriptions of effects on other resources, and notes where the terminology is derived from regulations applicable to a specific resource.

The intensity or degree of an impact is described as negligible, minor, moderate, or significant. Negligible effects are those that are unnoticeable, undetectable, or that result in no change to a resource. Minor effects are generally noticeable but result in only a slight change to a resource or occur in a small area, and do not change its function. Moderate effects are always noticeable, and result in some change to the resource or its function, and occur in several areas. Significant effects are always noticeable and result in a permanent change to a resource over a large area. Some resources, such as water quality and air quality, also have legal standards that are applicable to the analysis of impact intensity.

The impact analyses also discuss whether an action would cause or create an impairment of park resources and values. Impairment is defined as an impact that harms the integrity of park resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact rises to the level of impairment depends on the particular resource or value, on the timing, duration, and intensity of the impact, and whether the impact is direct or indirect. An impact is less likely to constitute impairment if it is an unavoidable result, which cannot reasonably be mitigated, of an action necessary to preserve or restore the

integrity of park resources and values. Impairment is more likely to result from impacts that affect resources whose conservation is necessary to fulfill park legislation, or are key to the natural or cultural integrity of the park or the opportunities to enjoy the park.
The actions common to alternatives 2 (proposed action) and 3 (preventative sanitation) include public education, mapping of POC, monitoring for POC health and effectiveness of management actions, analysis of the risk of spreading PL, and incorporation of POC protection into park project planning and fire management actions. There would be no effects on air quality, geological resources, soils, topography, water resources including water quality, floodplains and wetlands, wildlife, threatened or endangered species or any other rare species, cultural resources, or scenic quality from the actions common to alternatives 2 and 3. There would be indirect negligible long-term benefits to individual POC and to those plant associations that contain POC from the actions common to alternatives 2 and 3 that are discussed in more detail in the vegetation section below. There would be a minor increase in workload for some park employees (park operations) to provide the services outlined in actions common to alternatives 2 and 3. Some visitors and members of adjacent communities would appreciate receiving information on POC and how to reduce the threat from PL. These actions do not directly affect resources and values for which the parks were established, and therefore would not impair park resources.

Effects on Air Quality

There would be negligible adverse effects on air quality under all alternatives, including the no action alternative. All alternatives involve some degree of ground disturbance on the existing Little Bald Hills Trail from use of the trail by hikers, bicycles, and horses, and maintenance. Trail use creates local dust from feet, tires, and hooves on the trail. An individual horse creates slightly more dust than a bicycle, which creates slightly more dust than a hiker, but the differences in air quality effects from any of the user groups would still be negligible. Large groups of equestrians could potentially create enough dust to result in a minor adverse effect but it would be localized and temporary. Under the no action alternative, minor maintenance on the existing Little Bald Hills trail would create localized dust if the trail surface needs to be leveled. Since maintenance would occur only during the dry season under the no action alternative, all work would be done on dry soils, which would stir up more dust than if work was done on moist soils. Under the proposed action (Alternative 2), construction of the Little Bald Hills Trail reroute and rehabilitation of the abandoned segment would create localized dust when soils are grubbed to create a trail tread. The Hiouchi Trail is in a moist area that does not generate much dust. Under the preventative sanitation alternative (Alternative 3), ground disturbance from removal of trees would create temporary localized dust.

The overall adverse effect on air quality from any of the alternatives is negligible to minor, short-term, and very localized. The cumulative effects on air quality under any of the alternatives would be negligible, because the only sources of air pollution in the project area are vehicle emissions and smoke from fires. In the case of wildfire or prescribed fire, the Little Bald Hills Trail would be closed to use and there would be no contribution to air pollution from trail use. Therefore, air quality and air quality related values would not be impaired by the proposed action.

Effects on Topography, Geology, and Soils

Under all alternatives, including no action, there would be minor soil disturbance from trail maintenance. The disturbance would be localized at any given time but would occur over the length of the trail. Soil disturbance for maintenance would occur only in the existing disturbed trail corridor.

Under the proposed action (Alternative 2), there would be new disturbance on the new alignment for the rerouted section of Little Bald Hills Trail. The minimum tread width for an NPS hiking trail is three feet but the trail would more likely be four feet wide where possible to accommodate horses on the tread. If the trail is too narrow, the horses will create a wider trail corridor which could lead to erosion on those soils adjacent to the intended path that have not been prepared for use by horses. The length of the trail reroute is 3,000 feet, resulting in new disturbance to about 1.0 acres of soils altogether. There would be negligible adverse effects to previously

disturbed soils from blading the Upper First Gulch Road through the Mill Creek acquisition for access to the Little Bald Hills Trail.

There would be no direct impacts to soils from cutting trees under the preventative sanitation alternative (Alternative 3) but there would be negligible indirect impacts from work crews leaving the existing trail to drag cut trees into piles.

There would be no effect on topography under the no action alternative (Alternative 1) or Alternative 3 (preventative sanitation). Under the proposed action, rerouting the Little Bald Hills Trail would have negligible, long-term effects on topography on slopes only. The new alignment would be chosen to minimize alteration of the existing topography. Trail designers attempt to conform to existing topography to reduce the amount of vegetation and soil that must be cut and dug. Trails that conform to existing topography also retain natural drainage patterns. Minimizing disturbance to existing soils and drainage increases the long-term stability of a trail, which reduces maintenance needed and extends the life of a trail. The new alignment was chosen to conform to existing topography and gradual slopes to minimize cut and fill and the need to construct trail switchbacks. Following construction, the newly exposed soils would be lightly compacted and covered with local duff or small pieces of vegetation grubbed from the disturbance corridor to reduce erosion.

The effects on soils are negligible under all alternatives, resulting primarily from use and maintenance of the Little Bald Hills Trail, and long-term over the life of the trail. There are negligible adverse effects on soils from new disturbance to about 1.0 acres from rerouting the Little Bald Hills Trail under Alternative 2 (the proposed action). Erosion of newly disturbed soils and from the surface the existing trail would be minimized or avoided through locating the trail where soils are most stable and on gentle slopes of flat ground to the greatest extent practicable and minimizing cut and fill and the width of the disturbance corridor.

Continued loss of POC might affect nutrient cycling on the ultramafic soils of the Little Bald Hills, although this would be a very long-term process whose outcome is unknown at this time.

The cumulative effects on soils and topography in the Little Bald Hills area and throughout the parks are negligible under all alternatives.

None of the alternatives would have more than negligible adverse effects on soils or topography. Therefore, none of the alternatives would cause impairment to soils or topography.

Effects on Water Resources, Including Floodplains and Wetlands

There are no direct effects on permanent streams or other natural bodies of surface water under any of the alternatives. POC is not primarily a riparian species in RNSP and is not consistently associated with permanent streams or riparian zones in RNSP vegetation associations. Because POC root disease is transmitted through running or standing water, all actions are designed to avoid direct contact with running or standing water or to minimize human and livestock contact with water to the greatest extent practicable.

There would be no effects on floodplains under any of the alternatives. Only the Smith River and Mill Creek have well-developed floodplains, neither of which would be affected by any of the alternatives. The major infection site in the Little Bald Hills is located high in the drainage where stream channels are narrow and streams run intermittently.

Long-term adverse effects on water quality under any of the alternatives would be negligible. There would be no effects on water quality from removing trees under Alternative 3 (preventative sanitation). In places where the Little Bald Hills Trail is rerouted or where the Hiouchi Trail is improved to avoid contact of trail users with wet

soils (Alternative 2, the proposed action), there would be negligible adverse effects on water quality from erosion of disturbed soils within the trail corridor. Adverse effects on water quality from soil erosion within the Hiouchi Trail corridor would be localized at drainages. Adverse effects on water quality from soil erosion would be minimized or avoided for the Little Bald Hills reroute because the new section would be located where it does not cross stream channels. There would continue to be negligible localized adverse effects on water quality where the trail crosses larger stream channels near the beginning of the trail. These effects of run-off of eroded soil at stream crossings are temporary during and after rainstorms but would occur over the life of the trail.

Although POC is an important component of riparian zones in many places within its range, it is not a dominant riparian species in the project area and does not contribute significantly to riparian functions in the project area. To the extent that POC is associated with riparian zones in RNSP, there would be positive long-term indirect effects on riparian wetlands from actions that provide for the long-term survival of POC. The benefits would be greatest under the proposed action because that action provides protection for POC in the short-term as well. Under Alternative 3, POC in riparian areas would be the highest priority for eradication because the risk of PL transmission is greatest in riparian areas. There would be long-term adverse effects on riparian areas from removal of all POC until the risk of PL transmission is eliminated and removal of POC is no longer necessary. The adverse effects on riparian functions from preventative sanitation of POC under Alternative 3 would be negligible if POC are small and widely scattered but would be minor where more and larger trees are removed.

There would be minor long-term positive indirect cumulative effects on riparian wetlands throughout the range of POC from all alternatives. The degree of cumulative effect depends on the success of reducing PL-related mortality of POC within the parks so that POC persists in at least one portion of its range to serve as a source population in the event that populations of POC outside the parks do not survive the disease. There would be localized adverse effects on riparian areas under Alternative 3 (preventative sanitation) because that alternative requires that all POC be removed in infested areas to eliminate POC as a host for PL. These adverse effects would persist until other trees replace the lost POC.

The effects on water resources for all alternatives are related to effects on water quality from soil erosion and to effects on riparian wetlands. The effects on water quality are direct, negligible, localized at drainages, temporary and adverse during rain storms but long-term over the life of the trail from soil erosion due to trail construction (Alternative 2 only), and use and maintenance of the trail under all alternatives. The direct effects on riparian wetlands are indirect, localized in RNSP, and depend on whether POC are located in riparian zones. There would be short-term adverse localized effects from Alternative 3 if any of the trees to be removed are located in riparian zones. Because most POC in the project area is not a riparian associate, the effect on the functioning of riparian wetlands in the parks is negligible. POC is a more important riparian component along Mill Creek than along the Smith River. POC is an important riparian component in some portions of its range outside the parks. The cumulative widespread long-term effects on riparian wetlands throughout the range of POC would be significantly adverse in some areas if POC disappears from riparian zones throughout its range and significantly beneficial if POC persists.

None of the alternatives would have long-term adverse effects on water quality in RNSP. There would be negligible short-term localized adverse effects on water quality from soil erosion under all alternatives because the Little Bald Hills trail would continue to be subject to erosion of the trail surface. There would be negligible to minor adverse effects on riparian wetlands and functions under Alternative 3 from removal of all POC in infestations in riparian zones. Therefore, none of the alternatives would impair water quality or riparian wetlands or other water-associated resources in RNSP.

Effects on Vegetation, including Sensitive Species and Fuels

No federally or state listed or candidate plant species occur within POC habitats in the parks. Therefore, there would be no impact on threatened or endangered plants from any proposed alternatives, and there would be no impairment of threatened or endangered plant resources.

Loss of POC would be greatest under the no action alternative, as PL continues to kill trees, and widespread as POC throughout the parks become infected and die. Long-term persistence of POC would be greatest under the proposed action. The POC population in RNSP would stabilize over the very long-term, either because only PL-resistant trees have survived (no action alternative) or because the mortality rate declines due to effective control of the disease.

Alternative One (No Action)

Under the no action alternative, PL would continue to spread to those uninfected POC trees throughout the parks that do not have natural resistance to PL. In the Little Bald Hills, the spread of PL is slowed by the seasonal closure of the trail during the wet season. Elsewhere, the other infestation sites in the parks would continue to be sources for spreading the pathogen to nearby healthy POC. There would be more PL infestation sites and the spread to uninfested areas would be more rapid under this alternative than under Alternatives 2 (proposed action) and 3 (preventative sanitation).

Overstory POC trees would be killed by PL and would not be replaced by POC, because seedling and sapling POC trees would succumb to the disease before reaching overstory heights. Gaps may form in otherwise closed tree canopies, changing vegetation structure within stands. Other trees would experience an increase in growth to fill in gaps created by the loss of canopy trees. Shrub densities would increase until other conifers and hardwoods replace POC in affected stands. Snag density would increase as POC die.

In riparian zones, infestation and spread of PL would eventually lead to reduced recruitment of downed POC wood into stream channels. POC is not an important component of riparian habitat in the parks. Other trees contribute large woody debris to streams within the parks. Loss of POC along streams in the parks would have a negligible adverse effect on riparian functions.

The main effect on vegetation in the parks would be minor to moderate alteration of stand structure and species composition as POC declines. This would be a long-term widespread adverse effect in the northern part of the parks. The degree of change in stand structure and composition depends on the abundance of POC in a given stand. Stands with more POC would experience greater changes from POC mortality than stands with fewer POC or those stands where POC is widely scattered or sparsely distributed. Where POC is an important component of a vegetation association, loss of POC would be a long-term adverse effect that would be minor to moderate depending on the importance of POC in the association. POC is not expected to completely disappear from park vegetation communities because some individuals are likely to be resistant to the disease. Because there is no way of knowing which individual trees are resistant, there is no way to predict how many individual POC might persist or if those trees that do persist would do so in sufficient numbers to maintain a sustainable population over the long-term.

The no action alternative would increase the amount of dead POC, and thus increase fuel loading. There would be a negligible to moderate short-term adverse effect from increasing fuel loading, depending on the location. The effect would be negligible in most vegetation communities because POC is not abundant. The effect would be moderate in those areas in the Little Bald Hills where there are more POC present. Over the very long-term as dead POC decompose, the fuel loadings would decrease. POC decomposes very slowly, so the fuel load from dead POC might persist for many decades.

The overall effect of the no action alternative on POC in the parks is moderate, long-term, widespread throughout

park POC populations, and adverse from the continued loss of POC that are not resistant to PL coupled with an increased fuel loading in the Little Bald Hills. The no action alternative is unlikely to cause impairment to park vegetation resources because some POC have resistance to PL and would persist in park vegetation communities.

Actions Common to Alternatives Two and Three

The actions common to alternatives 2 and alternative 3 are designed to slow the spread of PL by increasing staff and public awareness of POC-related issues and by making recommendations for project modifications that would reduce the likelihood of the project introducing the disease to uninfested areas. These actions by themselves would have a negligible positive effect on existing vegetation species composition and structure in vegetation associations in the parks that have POC as a component. None of these actions have the potential to have direct positive or negative effects on POC and no potential for any direct short-term effect on any other plant species. The long-term effects on vegetation are negligible, indirect, positive, and would occur throughout the range of POC within the parks. The degree of benefit from increased public awareness of POC root disease depends on the success of these actions in combination with the proposed action (Alternative 2) or Alternative 3 (preventative sanitation) in maintaining healthy populations of POC in the parks. The degree of benefit to vegetation communities in general is less than the benefit to individual POC because POC is not a major component of park vegetation. The degree of benefit from maintaining a healthy POC population is greater for those plant associations where POC is a major component but the benefit depends to a greater extent on the direct effects from either Alternative 2 or 3.

The overall consequences of these actions would be a reduction in POC mortality and associated fuel loading over time. None of the actions common to all alternatives have the potential to directly increase fuel loading but POC in the existing infestations in the parks would continue to die and create additional fuels until the spread of PL is controlled and POC are no longer subject to new infections.

These actions would have negligible adverse effects on fuel loading (increased fuels) in the short-term and negligible to minor positive effects (reduced fuel loads) in the long-term.

The actions common to Alternatives 2 and 3 would not impair park resources because these actions would have no direct effect on POC mortality.

Alternative Two – (Proposed Action and Preferred Alternative) Reroute Little Bald Hills Trail, Hiouchi Trail Improvements, and Treat Small Localized Infestations

Under this alternative, stand structure and species composition of vegetation communities and associations would continue to be altered as infected POC die, but the mortality rate would be lower and fewer POC would be lost as infestations are controlled. Douglas-fir and tanoak are likely to replace POC in the vegetation layers and canopies. The primary source of continued infection in the Little Bald Hills would be isolated from human and livestock use by rerouting the Little Bald Hills Trail upstream and upslope from the infestation site, which would greatly reduce the potential for spreading PL. The current infestation site along the Little Bald Hills Trail would not be treated, although monitoring would continue. (The Little Bald Hills infestation covers a larger area than what would be treated through localized sanitation proposed under this alternative.) Mortality of non-resistant POC would continue in the infestation zones. The Little Bald Hills would continue to be a source of infestation from non-human vectors such as elk and deer wandering through infestations or if people use the abandoned trail, especially during the wet season, but the potential for spreading PL would be greatly reduced.

Rerouting the Little Bald Hills trail would affect about 1.0 acre of shrubs and understory vegetation that would be grubbed out to construct the trail. Shrubs and small trees up to 14 inches in diameter might be removed during construction. No changes would result in the forest canopy because any trees that must be removed would not be tall enough to be part of the canopy. Trail designers attempt to avoid a trail alignment that requires tree removal to the greatest extent practicable because tree stumps must be removed, which contributes to soil instability and

the cost of constructing the trail. Trail designers also attempt to retain large attractive shrubs such as rhododendron that contribute to the scenic quality of a trail.

Rerouting the Little Bald Hills Trail would require cutting small amounts of vegetation and piling it along the new trail route. The amount of vegetation placed along the trail would slightly increase the amount of fuel on the ground. The smaller fuels such as grasses and shrubs would decompose within one season and would result in a negligible short-term increase in fuels.

The Little Bald Hills Trail crosses serpentine soils. Several plant species listed by the California Native Plant Society as sensitive because of limited distribution occur in the Little Bald Hills in areas with serpentine soils. Park botanists have inspected the proposed new alignment of the trail and have determined that no sensitive plants are present. If sensitive plants were encountered during the final layout for the reroute, trail designers would attempt to avoid these individuals to the greatest extent practicable by altering the trail alignment.

Serpentine soils in the Little Bald Hills are generally inhospitable to most plant species, including invasive exotic plants. Therefore, rerouting the trail is not anticipated to increase exotic plant populations along the new trail.

Access to the Little Bald Hills to reroute the trail would require brushing along both sides of the Upper First Gulch Road on the recently acquired Mill Creek property south and west of the Little Bald Hills. The plant species growing within the road corridor include huckleberry and manzanita, as well as other shrubs that are common throughout the parks and are routinely trimmed for trail and road maintenance.

Hiouchi trail improvements and localized sanitation of POC within the Hiouchi Trail infestation site (Figure 2, site 4) would have no effect on other riparian or forest vegetation. Trail improvements would take place within the existing disturbed trail corridor, and would remove only small amounts of trailside vegetation. The effect of trail improvements on vegetation would be negligible because vegetation along trails is cleared during routine trail maintenance. Trail improvements would have no effect on fuel loading

Cutting or girdling of trees less than 15 inches in diameter for localized sanitation at site 4 would result in negligible changes to vegetation community structure and composition in less than 2 acres in the old-growth forest and riparian zone immediately adjacent to the Smith River. There would be a negligible increase in the potential for invasion by exotic plant species in those areas from which POC are removed. These areas are already subject to invasion by exotic plants because of human use. Areas from which POC have been removed would be monitored for invasive exotic plants during periodic surveys for POC seedlings, and any invasive plants would be removed along with the POC seedlings.

The direct effects of the proposed action on vegetation and plant communities in RNSP from rerouting the Little Bald Hills Trail, brushing the Upper First Gulch Road for access to the Little Bald Hills, and for trail improvements at wet areas along the Hiouchi Trail are negligible, short-term, localized, and adverse. There are negligible direct localized long-term adverse cumulative effects on vegetation from brushing the Little Bald Hills and Hiouchi trails to maintain a passable trail corridor. Removal of POC from site 4 along the Hiouchi Trail is a negligible localized long-term adverse effect on the plant community in this site and negligible for park-wide plant communities.

Localized sanitation by cutting and girdling trees in the very small infestation site along the Hiouchi Trail (Figure 2, site 4) would result in a negligible localized increase in ground fuels. Non-resistant POC would continue to succumb to PL, increasing the fuel loading at the infestation site and in other areas where POC are subject to PL infections.

Over the long term, this alternative would minimize fuel loadings by reducing spread of PL to uninfected locations. The effects of this alternative on fuel loading depend on the success of these actions in combination

with public education, monitoring, and designing projects to account for POC in reducing the spread of PL over the long-term. In the short-term, non-resistant POC that are infected with PL would die, increasing fuel loading where POC are currently infected.

This alternative would have long-term benefits on fuel loading (reduction of fuel) to the extent that POC mortality is reduced. The benefits would be negligible to minor depending on the abundance of POC in any given area. There would be short-term negligible adverse effects on fuel loading (increased fuel) at the small infestation site along the Hiouchi Trail with a long-term benefit after the trees are permanently removed from the sites and no longer constitute a fuel source. There would still be other fuels at the removal sites, so the benefit would be negligible.

The vegetation removed for rerouting the Little Bald Hills Trail, brushing the First Upper Gulch Road, and for minor improvements to wet areas along the Hiouchi Trail is common and routinely cleared or cut back for trail maintenance. Therefore, these actions would not impair park vegetation resources.

Non-resistant POC would continue to die in the PL infestation sites along the current alignment of the Little Bald Hills Trail until either the POC seed bank or the PL spore bank are exhausted. This would be expected to last for at least several decades, since POC seeds prolifically and PL spores can survive in soils for as long as 7 years. Removal of all healthy and diseased POC under 15 inches in diameter from the Hiouchi Trail infestation (Figure 2, site 4) would be a direct, localized, long-term adverse effect but resistant POC would persist in other places in the parks. Although some POC would die or be removed, POC would persist in RNSP as long as there are PL-resistant trees. Therefore, the proposed action would not impair park vegetation resources.

Alternative Three - Preventative Trail and Road Side Sanitation Throughout POC Areas (Preventative Sanitation)

Under this alternative, all POC including both healthy and infected POC in all stages from seedling to mature trees would be removed within 25 to 50 feet on both sides of segments of Howland Hill Road, Little Bald Hills Trail, Mill Creek Trail, Hiouchi Trail, and several other short trails along the Smith River corridor where infected POC could serve as a disease source for future infestations. Preventative sanitation is intended to reduce the potential for spread of PL along roads and trails where the risk of road or trail users picking up PL is the greatest, reducing the likelihood of new infestations and minimizing long-term POC mortality from the disease.

This alternative would result in the removal of thousands of healthy and diseased POC trees in all age and size classes from along these roads and trails. Some disease resistant POC are likely to be removed as a consequence of this action. The impact would be greatest in the Little Bald Hills because this area has the greatest concentration of POC in the parks and the largest infestation area. This would be a long-term effect on the order of at least seven years but more likely, over ten to twenty years and longer, since PL would continue to exist outside the parks with a potential for continual reintroduction.

Cutting or girdling all POC along roads and trails would result in a temporary increase to ground fuels. Removing thousands of trees over at least seven years would increase the fuel loadings along roads and trails. Fuel loading would be greatest in the short-term when the largest trees are removed. This would have a minor to moderate adverse effect on fuel loading (increased fuels) over the period during which POC must be continually removed. After the largest trees have been removed, the fuel loadings would decrease because only seedlings would be removed.

The long-term effect on vegetation along the roads and trails listed above would be conversion of 48 acres of vegetation associations that have large components of POC to a different type of vegetation association. , The 48 acres includes 34 acres in old-growth redwood forests where the presence of POC creates a unique vegetation association, This alternative would result in gaps in the forest canopy from the removal of POC until other species

fill in the gaps. Exotic species presence and abundance might increase in the short term due to increased light availability, but the exotic species would be shaded out as other trees fill in the canopy gaps. Roads are already susceptible to invasion by exotic plants, so there would be a negligible increase in the area available for invasion by exotic plants.

Over the long-term, the spread of PL within RNSP would be reduced because there would be no host POC available for infection along any roads or trails. POC produces many seeds and would continue to sprout until the seed bank within the parks is exhausted. However, both POC and PL would continue to exist both outside the sanitation zone and outside the parks and would serve, respectively, as a seed source for POC recolonization in the sanitation zone and as source of PL re-infection until the POC seed bank is exhausted. Exhaustion of the POC seed bank, recolonization from outside the sanitation zone, and reinfestation from other disease centers is anticipated to occur over at least seven years and more likely several decades.

Most of the POC removed along roads and trails would be small but some large mature trees would be removed. The greatest number of trees would be removed along the Little Bald Hills Trail. The removal of all POC along roads and trails within the parks would be a minor direct long-term adverse localized effect on populations of POC within the parks and a direct moderate long-term localized adverse effect on POC populations in the road and trail corridors. The effect on park vegetation communities from removal of POC along roads and trails would be negligible because POC is not critical to ecosystem or plant community structure and function in RNSP.

PL would exist outside the sanitation zone and the parks and would provide a continual source for re-infection of POC within the sanitation zone. POC would continue to exist inside and outside RNSP and is expected to survive within its native range provided the measures described by the BLM in the May 2004 *Record of Decision for Management of POC in Southwest Oregon, Coos Bay, Medford, and Roseburg Districts* (ROD) are effective at reducing the spread of PL. The USFS management direction is assumed to be similar to BLM management. The ROD describes eradication of POC in localized areas as an unproven measure for controlling the spread of PL. RNSP does not contain stands of POC that are critical for ecosystem function, i.e. the only source of shading or large woody debris for streams. A small percentage of POC appear to be resistant to the root disease, although the number of resistant trees in RNSP is not known. There is uncertainty about the effectiveness of controlling the spread of PL by eradicating POC from along roads and trails, as well as uncertainty about the degree to which resistant POC will survive throughout the range of the species, and a lack of information about the resistance of RNSP trees.

The removal of all POC within fifty feet of 7.8 miles of roads and trails (a total area of about 47 acres affected, 34 of which are in old growth redwood forest) for the foreseeable future would not be considered an impairment to park vegetation communities because POC would be present in other locations in the parks and because the non-resistant POC would eventually die from PL anyway.

Effects on Wildlife and Fish, including Rare, Threatened and Endangered Species

None of the alternatives have the potential for direct adverse effects on fish, fish habitat or stream-dwelling species. No streams would be directly affected by any of the actions under any of the alternatives. POC provides shade and large woody debris for streams, but it is not a major riparian component along RNSP streams. Other tree species serve these functions along streams in the project area.

Alternative One (No Action)

Under the no action alternative, the continued spread of PL to uninfected POC would result in a conversion of one wildlife habitat element (live trees) to a different type (snags). The main impact on wildlife would be the alteration of stand structure and species composition over the long-term as POC die. In the Little Bald Hills , where the largest PL infestation in RNSP occurs, the current alignment of the Little Bald Hills trail would likely

result in the transport of the disease to uninfested POC stands farther up the trail. This would cause a continued reduction of forest canopy and an increase in shrub cover as POC continue to become infected and die. The forest canopy would fill in over several decades with other tree species, most likely tan oak and Douglas-fir.

In infestation sites, overstory trees would be killed by disease, resulting in hard snags with the potential to persist for many years. POC snags would create habitat for woodpeckers and other cavity dependent species and, in the case of large snags with cavities, could provide rest, den and/or nest sites for late-successional forest associates such as the Pacific fisher and northern spotted owl. This would be a negligible to minor benefit to cavity dependent wildlife species, depending on the number of POC snags.

The loss of large POC in proximity to other old-growth trees could have a negative impact on the marbled murrelet if dead POC reduce the quality of marbled murrelet nest sites due to a reduction in canopy cover that helps protect nesting murrelets from predation. The loss of large POC also could result in a negative impact on marbled murrelet critical habitat due to a reduction in primary constituent elements.

The no action alternative would have no potential for disturbance to nesting spotted owls and would not affect the mardon skipper or its habitat.

The no action alternative would result in continued loss of POC which would have minor localized adverse effects on wildlife species, including threatened and endangered species, where large live POC are important constituent elements of habitat. For those species of birds and mammals that occupy those habitats where POC are present and that use dead trees and snags, there would be a minor to moderate localized benefit to individuals where snags are created but the degree of benefit to populations of cavity dependent wildlife is negligible to minor.

Actions Common to Alternatives Two and Three

The actions common to all alternatives are designed to slow the spread of PL by increasing staff and public awareness of POC-related issues, and making recommendations for project modifications that would reduce the likelihood of the project introducing the disease to uninfested areas. To the extent that education and project planning slow the spread of PL and reduce long-term mortality of POC, the effects on wildlife habitat would be positive from retention of current vegetation species composition and structure.

None of the actions common to all alternatives have the potential to have direct effects on wildlife, including threatened and endangered wildlife. These actions would have negligible to minor long-term positive effects on wildlife species that occupy areas with POC to the extent that POC persists as a component of park vegetation communities. These actions would not impair wildlife resources, including threatened and endangered wildlife species, in RNSP.

Alternative Two – (Proposed Action and Preferred Alternative) Reroute Little Bald Hills Trail, Hiouchi Trail Improvements, and Localized Sanitation

Under the proposed action, the main impact on wildlife would result from habitat changes due to continued POC mortality and POC treatment actions in the short-term with a long-term benefit as mortality of POC decreases. Wildlife also could be affected by localized disturbance from humans and equipment associated with project activities.

The NPS prepared a biological assessment under section 7 of the Endangered Species Act to analyze effects on listed threatened and endangered species that might be affected by this project. The project area under the preferred alternative includes habitat for two listed threatened bird species (northern spotted owl and marbled murrelet), and two candidate species (fisher and mardon skipper).

No potentially suitable marbled murrelet nesting habitat, including primary constituent elements of critical

habitat, would be removed or modified by any of the proposed management actions. The proposed action would not affect marbled murrelets provided that work restriction periods are observed.

The NPS determined that the proposed action may affect but is not likely to adversely affect the fisher and may adversely affect the mardon skipper. Because these two species currently are candidates for federal listing, concurrence from USFWS is not required.

The USFWS has concurred with the NPS determination that the proposed action may affect but is not likely to adversely affect the northern spotted owls, provided that work restriction periods are observed. The proposed action would have negligible to minor short-term localized adverse effects on habitat suitable for northern spotted owls from continued mortality and removal of POC for the Little Bald Hills trail reroute and to treat the localized infestation on the Hiouchi Trail but no direct effects on owls.

The largest population of POC and the largest POC infestation occurs in the Little Bald Hills, and the changes to forest stand structure as a result of POC mortality would be greatest in this area. Rerouting the Little Bald Hills Trail out of the infestation site is expected to substantially slow the spread of disease from this site. Thus, forest canopy would be retained at close to current levels and gradually increase as Douglas-fir and tanoak replace the diseased POC. Construction of the rerouted section of the Little Bald Hills trail would require removal of some elements of potentially suitable spotted owl habitat along 0.22 mile of the reroute area. This is estimated to result in degradation of a maximum of one acre of spotted owl nesting, roosting, and foraging habitat. Shrubs and small trees (less than 14 inches diameter) might be removed from the trail corridor, and downed woody debris would be cleared where necessary by moving it out of the trail corridor. Spotted owl surveys would be done at this location to ensure that no owls would be adversely affected by trail construction activities. Trail crew access to the Little Bald Hills reroute area would require brushing and blading the Upper First Gulch Road to allow passage by vehicles and other motorized equipment. There are 150 acres of potentially suitable nesting and roosting habitat within one-quarter mile of this access road that would not be surveyed. Any spotted owls nesting within this area would be subject to noise disturbance later in the breeding season. Access by work crews and motorized equipment would require passage across approximately four acres of potentially suitable mardon skipper habitat. Portions of the Jeffrey pine/fescue grasslands in the Little Bald Hills are occupied by mardon skippers, there is a possibility that access across suitable habitat might harm larvae of this species. Rerouting the Little Bald Hills trail would not affect aquatic species as the rerouted section is outside of riparian habitat.

Under this alternative, trail improvements in areas along the Smith River would not affect terrestrial wildlife habitat. At some sites with small, localized infestations, diseased POC trees up to 15 inches in diameter may be removed by girdling and/or cutting. It has been determined that treating these sites would degrade a negligible to minor amount of spotted owl habitat. Girdling trees in the 6–15 inch diameter size class would result in creation of snags that are the appropriate size for use by small woodpeckers and small cavity-nesting songbirds.

To date, no spotted owls have been found during surveys of all known infestation sites along the Smith River, including the Hiouchi Trail infestation site. Therefore, treating this site and other small sites that meet the criteria outlined in the Alternatives section (localized sanitation) would not affect this species. Treatment of any additional infestation sites occurring in un-surveyed suitable spotted owl habitat would be subject to a work restriction period.

The ambient background noise levels are high (e.g., creek and river sounds, vehicle traffic noise, and visitor activity) at most of the known infestation and many sites with currently uninfected POC. Wildlife present at these sites is assumed to have become habituated to increased levels of noise in the environment. The Hiouchi Trail site, the only location where localized sanitation is currently proposed, is close to U.S.199 and the Smith River. Therefore, noise related to POC management would not result in increased levels of disturbance regardless of time of year.

Trail improvements along the Smith River would not affect aquatic species. At some sites with small, localized infestations, diseased and healthy POC up to 15 inches in diameter may be managed by girdling and/or cutting. Should these sites occur in a riparian area a slight change in habitat quality might occur due to increased light levels penetrating the canopy. However, the infestation sites to be treated in this way would be small and localized, so any changes in habitat quality would be restricted to a relatively small area. This would be a negligible localized adverse effect that would persist until other trees species fill in the canopy.

All of the currently known infestation sites requiring treatment are outside of fish-bearing reaches of streams and little or no sediment is expected to be mobilized into a stream network. If new infestation sites are discovered near fish-bearing streams, Best Management Practices would be implemented using criteria outlined in an unrelated programmatic BA and biological opinion (Redwood National and State Parks Annual Routine And Non-Routine Road Maintenance Program, File Number: 151422SWR02AR6347, dated 3/4/03). These criteria include allowing work to occur only in the dry season

The proposed action would have negligible to minor, short-term localized adverse effects on wildlife, including threatened bird species and the fisher, from disturbance from humans and equipment during construction of the Little Bald Hills Trail reroute. There might be moderate adverse effects on mardon skipper butterflies from work crews walking through skipper habitat if eggs or larvae are present. There would be negligible effects on wildlife from removal of POC at infestation site 4 along the Hiouchi Trail or from trail improvements, because these areas are subject to ongoing disturbance from use and maintenance of the trails, and because other trees are present to provide habitat. The primary impact on wildlife would be a negligible to minor adverse effect on wildlife habitat from loss of POC until the spread of PL is reduced and no new trees are infected, and other tree species fill in gaps in the canopy. Cavity-nesting birds would benefit from creation of snags as larger POC die.

Minor indirect long-term cumulative impacts on northern spotted owls would result from continued annual trail maintenance through suitable northern spotted owl habitat during the latter half of the breeding season.

The proposed action would not impair wildlife resources, including threatened and endangered wildlife species.

Alternative Three- Preventative Trail and Road Side Sanitation Throughout POC Areas

Under this alternative, the impacts to terrestrial wildlife would be similar to the no action alternative due to changes in stand structure and species composition as POC are removed. There would be negligible indirect adverse effects on wildlife populations from continued mortality of POC.

Removal or girdling of POC would occur along an estimated 7.8 miles of roads and trails, resulting in approximately 48 acres of forested habitat impacted in a 50 foot wide corridor along several trails and roads. Thirty-four of the 48 acres affected are in old-growth forest. There is a possibility that preventative sanitation would remove or kill some disease-resistant POC, which would increase the negative impacts on northern spotted owls, marbled murrelets and marbled murrelet critical habitat, and other late-successional associated species. Implementing activities under this alternative in or within one-quarter mile of suitable spotted owl and/or marbled murrelet habitat during the breeding season could result in adverse impacts to these species due to disturbance. These impacts would be localized along the roads and trails and would be greatest in the short-term when larger trees are removed. The degree of disturbance would decrease as seedlings and smaller trees are the only POC that must be removed in the sanitation areas. These effects would be negligible to minor, localized, and would occur over the long-term until all POC are gone for at least seven years.

POC snags created by girdling would create habitat for woodpeckers and other cavity dependent species. Large snags with cavities provide rest, den and/or nest sites for late-successional forest associates such as the fisher and northern spotted owl. Creation of snags would be a negligible long-term positive effect on populations of cavity nesting wildlife species in the northern part of the parks, although the positive effects on individual animals would

be greater than on the populations of any given species.

Under the preventative sanitation alternative, the impacts to fish, fish habitat, and aquatic species would be mainly from reduced canopy cover and recruitment of woody debris to the stream channel along 7.8 miles of trail. Preventative sanitation would be focused at locations where surface water accumulates or flows across roads or trails. Treatment of the one site on the Hiouchi Trail where surface water may intersect the trail could affect 0.2 acres of riparian habitat. Aquatic species in areas associated with preventative sanitation would be subject to increased light levels, increased water temperatures and possible disturbance due to management actions but these effects would be minor because POC are not a dominant tree species in riparian zones where POC would be removed. The minor adverse effects on aquatic species from removal of POC in riparian zones would occur until other tree species fill in gaps in the canopy.

This alternative would have minor adverse effects on fish and aquatic species that would occur in riparian areas associated with the 7.8 miles of roads and trails where POC would be removed. Somne of these areas might constitute high quality fish habitat, including habitat for the federally-listed threatened coho salmon, that could be adversely affected due to changes in light level or water temperature. These impacts are expected to occur until other tree species become established in gaps created by POC removal, and are considered minor because POC is not the dominant riparian tree species and other plant species can provide the riparian functions needed for high quality fish habitat.

This alternative would have minor adverse effects on wildlife that would occur primarily in a 50-foot-wide corridor along the 7.8 miles of roads and trails where POC would be removed. These areas do not constitute high quality wildlife habitat because of on-going disturbance from use and maintenance of the roads and trails.

The preventative sanitation alternative would not impair park wildlife resources, or listed or candidate threatened or endangered species of wildlife or fish, because any adverse effects on listed or candidate threatened or endangered species, or their designated critical habitat, associated with death or removal of POC are negligible to minor.

Effects on Cultural Resources

All alternatives include actions that will be subject to consultation under Section 106 of the NHPA. The NPS would therefore, consult with the California State Historic Preservation Officer in the identification of cultural resources meeting the criteria of significance for the NRHP, determine the affects of proposed actions on such cultural resources, and would consult to determine how to reduce any adverse affects. Consultation with the Smith River Rancheria and the Elk Valley Rancheria would also be conducted.

If any subject actions meet the criteria for exclusion under Section IVB of the the 1995 service-wide Programmatic Agreement among the NPS, the National Conference of SHPOs and the Advisory Council on Historic Preservation (the 1995 service-wide PA), such activities would be addressed under this programmatic agreement in compliance with Section 106 of the NHPA.

Section 106 of the NHPA, as amended, requires that Federal agencies take into account the effects of their undertakings on historic properties as defined in the Code of Federal Regulations (36 CFR 800) and afford the Advisory Council for Historic Preservation a reasonable opportunity to comment on such undertakings. Historic properties consist of properties that are eligible for or listed on the NRHP. The regulations of 36 CFR 800 define how the park service will identify historic properties, conduct necessary public and tribal participation and consultations, and assess affects. Effects on historic properties under 36 CFR 800 are defined as “no historic properties affected”, “no adverse affect” or “adverse affect”. The SHPO advises and assists Federal agencies in carrying out their Section 106 responsibilities.

In addition, the 1995 service-wide PA allows NPS to streamline its consultation process under Section 106 of the NHPA for activities that are considered routine and are defined in Section IVA and IV B of the 1995 service-wide PA. Many of the activities described within this POC management EA are considered activities that are routine to park management, including public education, fire management, road and trail maintenance, and exotic plant control.

Proposals for POC management are anticipated to have negligible to minor impacts on archeological or historic resources, traditional cultural properties, or cultural landscapes. Every effort would be made to avoid adverse impacts to cultural resources by routing trails away from known resources and sites that might be damaged by construction, maintenance, or visitor use. When avoidance is neither feasible nor prudent and the undertaking might result in adverse impacts, the NPS or CDPR would determine appropriate mitigation in consultation with the California SHPO and the Smith River Rancheria and Elk Valley Rancheria as appropriate.

The NPS and CDPR would consult with affiliated American Indian tribes, including the Smith River Rancheria, Elk Valley Rancheria, and THPO where appropriate, to develop the POC management strategies in way that respects the beliefs, traditions, and other cultural values of American Indian tribes that have ancestral ties to lands encompassed by RNSP. The NPS and CDPR would consult with American Indian groups on all actions that have the potential to affect cultural resources associated with that group. Should consultations indicate that any proposal would adversely affect Yurok or other American Indian cultural sites or interfere with traditional activities conducted in accordance with applicable laws and regulations, the NPS and CDPR would work with affected tribes and the California SHPO as required to develop appropriate mitigation strategies.

Alternative One (No Action)

No impact to cultural resources eligible for or listed on the NRHP would be expected from the no action alternative. The Little Bald Hills Trail would continue to be seasonally closed. Although a portion of the Little Bald Hills Trail that is seasonally closed is a historic portion of the Kelsey Trail, no effect to the historic trail would occur from seasonal closure.

No mitigations are necessary, since no impact to cultural resources could occur as the result of no action.

The no action alternative would have no effects on, and therefore would not impair, cultural resources.

Actions Common to Alternatives Two and Three

None of the action items listed as common to all alternatives have the potential to adversely impact cultural resources, since these include the implementation of a decision making process only.

No mitigations are necessary since no impact on cultural resources would occur as a result of the actions common to Alternatives 2 and 3.

Alternative Two – (Proposed Action and Preferred Alternative) Reroute Little Bald Hills Trail, Hiouchi Trail Improvements, and Localized Sanitation

Approximately 4,200 feet of the existing Little Bald Hills Trail would be permanently closed and a reroute of approximately 3,000 feet in length would be constructed. Rehabilitation of the 4,200-foot section of the Little Bald Hills Trail would consist of replanting the ends of this portion of trail with native vegetation and covering with brush. An archeological survey was conducted by NPS and consultation with the Smith River Rancheria and Elk Valley Rancheria was conducted to identify any cultural resources that could be affected by the proposed reroute (Anderson 2004). This section of trail to be closed consists of a portion of the historic Kelsey Trail. This action would have no impact to the historic trail.

Brushing the ends of the existing Little Bald Hills Trail to keep visitors off the old trail route after that section is closed and abandoned would have no adverse impact to the Kelsey Trail. Installation of signs to prevent visitor access through the newly closed area would have no adverse impact to the location. Any signs that are needed to implement the closure would be installed on T-posts, requiring a minimum amount of ground disturbance.

Minor trail improvements on other trails have the potential to have minor impacts on cultural resources that are eligible for or listed on the NRHP. Any trail segments that would be rerouted or constructed to avoid the adverse effects of social trails on soils and vegetation would be located to avoid archeological sites or other historic features that could be adversely impacted from construction and trail use. Trail maintenance and repair is a routine park operation. Therefore, no adverse impact to cultural resources is expected from this type of work.

Removal of POC trees in localized infestation sites would result in no impact to cultural resources. Trees can be cut and girdled without ground disturbance. Any pile burns associated with removal of trees would take place at least 50 feet from any known archeological site or other cultural resources that could be affected by a burn pile. Consultation under Section 106 of the NHPA would be required for proposed actions prior to implementation.

Management of small, localized active disease centers by cutting or girdling trees would have negligible to minor impacts to traditional cultural properties or cultural landscapes. Removal of trees from a particular location could change the setting of a cultural landscape, or affect the feeling of a place that is used traditionally by local Tolowa people. No impact to archeological resources or historic resources would be expected because no ground disturbance would be required by cutting and girdling trees. Seedlings can also be removed by hand within areas sensitive for archeological or historic resources to minimize ground disturbance.

Disposal by burning of debris created as a result of cutting would have no adverse impact to archeological and historic resources, nor on resources of ethnographic significance, or cultural landscapes. Burn piles would be placed in areas where no historic resources are located or where impacts will not be adverse.

In the event that future recommended trail improvements are required such as draining, re-routing, and armoring of trails, cutting or girdling of trees, and establishing burn piles to reduce hazardous fuels, and since these activities are considered part of routine maintenance undertaken by RNSP, these activities would be reviewed under the 1995 service-wide PA in compliance with Section 106 of the NHPA. In the event that significant cultural resources are located within a proposed project area and adverse impacts to such resources could occur, NPS would consult with the California SHPO, Smith River Rancheria, and Elk Valley Rancheria as appropriate under 36 CFR 800

The proposed action would negligible to minor adverse effects on, and therefore would not impair, cultural resources.

Alternative Three – Preventative Trail and Road Side Sanitation Throughout POC Areas

Complete removal of POC within a 50-foot-wide corridor over many years along any trail or unimproved road in the Smith River watershed could have an adverse impact on resources of ethnographic significance to Tolowa people. In addition, the cultural landscape of the Kelsey Trail could also be adversely affected. If removal of trees is limited to cutting or girdling, and leaving the fallen trees in place, no adverse impact to archeological resources would be expected. However, if trees had to be removed from the site, removal could result in ground disturbance, which could have an adverse impact to archeological sites within POC areas.

In the event that preventative sanitation of trail and road side POC occurs in an area containing significant cultural resources such as resources of ethnographic significance, traditional cultural properties, and cultural landscapes,

consultation with the SHPO, the Smith River Rancheria and the Elk Valley Rancheria would be conducted in compliance with Section 106 of the NHPA.

To reduce the adverse impact on archeological resources of eradicating healthy and diseased POC along trail and road corridors, work would have to be conducted in such a way as to minimize ground disturbance associated with the removal of trees.

The preventative sanitation alternative has the potential to impair a cultural landscape and ethnographic resources.

Effects on Park Operations

Park operations in the project area include law enforcement, visitor education, resource management including exotic plant control and fire management, and maintenance of roads, parking areas, trails, trailheads, administrative facilities including park employee housing and the Hiouchi fire management facility, and visitor facilities including the drive-in campground at Jedediah Smith Redwoods State Park and the backcountry horse camp in the Little Bald Hills. Fire management would be affected more than other park operations because crews might need to pass through infested areas to reach wildfires or to conduct hazard fuel reductions in the Hiouchi area or along park boundaries.

Alternative One (No Action)

The Little Bald Hills Trail would remain closed during the wet season, reducing the time available for park maintenance crews to perform routine maintenance to the months of June through September, or whenever the trail is open to the public. Park resource management crews would not be able to use the trail while it is closed, so that planning for fire management work that requires site visits or conducting biological surveys would be limited to a four-month period from June through September. This would be a direct long-term negligible to minor adverse effect on park operations, depending on the urgency of the project.

This alternative would have no effect on current wildfire suppression activities. Current effectiveness of water operations on wildfire incidents would remain the same as no recommendations on water sources and use would be made. No requirement for cleaning vehicles would be implemented. Fire fighting costs are anticipated to be less and final fire sizes would likely be smaller compared to the action alternatives. Fuel management activities would take place without having to design projects to avoid PL-infested areas or to clean equipment after working in PL-infested areas. Projects would not require consideration of access through PL-infestations. PL would continue to create pockets of dead trees, increasing available dead fuels for fire consumption. Fuel loading would be greatest in areas with mature trees at the time of mortality of POC and would be greatest in the Little Bald Hills .

This alternative would result in initial cost savings for fire management because fire crews would not have to clean equipment, would be able to take the shortest or most direct route to wildfires, and would not have to search for water sources that are free from PL infections. In the long-term, fire management costs would increase as POC continue to die and fuel loadings are increased, resulting in more intense fires in some locations. Over the very long-term the fuel loadings would decrease as dead POC decompose. The long-term effects on fire management would be a negligible to moderate and adverse, depending on whether the wildfire is located in an area with large volumes of large dead POC.

Actions Common to Alternatives Two and Three

Maintenance and resource management staff would be required to clean all equipment prior to entering an uninfested area or after leaving an infested area to ensure that PL is not transported into uninfested areas.

Fire management operations would require identification of access routes that do not cross infected areas. Additional time might be needed to access some areas with crews and equipment if the most direct access crosses an infested area. The Smith River flows through major infestation sites, and the river water is assumed to be contaminated with PL spores. Fire planners would need to identify another water source for fire suppression if uncontaminated water is needed. The NPS is not proposing to treat water with Clorox™ because the potential for adverse effects to park fish and other aquatic resources from a Clorox™ spill outweighs the benefit from faster fire suppression.

There would be a minor effect on park operations from implementing the recommended actions in this alternative because of a slight increase in staff time to plan and carry out project activities. The NPS would incur increased costs to implement projects that are proportional to the increase in time for planning and implementation. All park operations would be subject to review and application of the risk key to ensure project activities do not increase the risk of PL spread from infested sites to healthy POC. The consequences of adopting the risk key in the management decision process may include minor to significant modification of the original proposal or project. Project costs may increase slightly to moderately depending on project modifications.

Alternative Two – (Proposed Action and Preferred Alternative) Reroute Little Bald Hills Trail, Hiouchi Trail Improvements, and Localized Sanitation

The effects on park operations under the proposed action include the time and cost to reroute the Little Bald Hills Trail, improve small sections of trails, and remove trees from the localized infestation sites. Rerouting the Little Bald Hills Trail would require several months for the trail crew to design and construct the new section, at an estimated cost of $60,000. There would be little or no change in the time needed for maintenance of the new trail. Trail improvements to other trails would also require time depending on the amount of work needed. Tree removal at Hiouchi Trail is anticipated to take a crew of 2 people less than one week to accomplish.

Rerouting the Little Bald Hills Trail would have no effect on fire management activities in general. Access in case of wildfire could be either enhanced or hindered by moving 3000 feet of the trail depending on the location of a wildfire. The enhancement or hindrance would be negligible to minor, depending on the location of the fire. Trail improvements would have no effect on fire management actions, because the trails would remain in the same locations. Removal of all POC from the Hiouchi Trail infestation sites would have no effect on management of wildfires or prescribed fire, because this area is less susceptible to wildfires and no prescribed fires are proposed in this area.

Alternative Three- Preventative Trail and Road Side Sanitation Throughout POC Areas

This alternative would require time to locate and remove all live healthy and diseased POC for 25 feet on both sides of about 7.8 miles of roads and trails, with inspections and removal of seedlings in the same area for at least seven years. This would result in a long-term adverse effect on park operations due to the time and cost of inspection and removal of trees.

This alternative would require removal of the cut POC from the road and trail corridors to prevent fuel buildups. This would be a short-term moderate adverse effect on the fire management program because crews would need to treat the cut trees that have become fuel, and a long-term minor effect after the large trees have been removed and only seedlings remain.

The overall effect on park operations under alternative 3 (preventative sanitation) would be a minor long-term increase in time and cost to the park.

Effects on Visitors and Adjacent Communities

Alternative One (No Action)

Under this alternative, there would be a negligible effect on current levels of visitor use and recreational activities in the parks. The Little Bald Hills trail would continue to be seasonally closed during the rainy season and the other trails through POC areas would remain open year round unless closed for other administrative purposes. Most of the trail use occurs during the dry season, but some trail users would be negatively affected by not being able to use the trail during good weather during the closure period. The greatest effect would be during episodes of good weather between November and May on local trail users who live close enough to be able to use the trail regularly but cannot access the closed trail.

The effects on adjacent communities would result primarily from the effects on local trail users.

Visual quality would be affected as PL kills additional POC trees along the banks of the Smith River adjacent to old-growth redwoods. Effects would vary based on the number of dead and dying trees, the length of time that snags persist, and length of time for the site to recover with replacement tree species. The greatest effect would occur along the Little Bald Hills Trail because there are more POC along this trail. Along the Little Bald Hills trail, the infestation site would continue to present a dramatic contrast of healthy green forest vegetation interrupted by a section of trail lined with dying or dead POC that are a rusty red color. This contrast would persist until replacement trees are able to achieve canopy status. This would be a long-term negligible to moderate adverse effect on visual quality and the experience of some visitors. Over the long term, the red color would change to gray as the trees lose their needles and the contrast between healthy and dead trees would be lessened.

This alternative would not impair visual quality or scenic resources because POC occurs with other tree species and there are no extensive pure stands of POC where dead trees would become a dominant landscape feature.

Actions Common to Alternatives Two and Three

Effects to visitors and local community members will be minor and positive. These actions are intended to slow the spread of PL by enhancing public outreach, monitoring the occurrence and spread of PL infestations, and utilizing uninfested water for operational and fire management needs when safe and appropriate. The safety of life and property will always take precedence over POC concerns during fire suppression activities. The decision to utilize uninfested water for fire suppression will only be made if any associated delays would not elevate the risk of fire spread to adjacent communities, therefore there will be no effect to local communities. Local communities may experience slightly enhanced fire safety as a result of slower POC mortality and thus slower fuel build-up but the overall effect on adjacent communities would still be negligible.

Alternative Two – (Proposed Action and Preferred Alternative) Reroute Little Bald Hills Trail, Hiouchi Trail Improvements, and Localized Sanitation

Under the preferred alternative, rerouting the Little Bald Hills Trail around the infestation site would shorten the trail by about 1,000 feet (0.2 miles) and allow for year-round visitor access to the Little Bald Hills and primitive campground. Use of the trail year-round increases the risk that visitors would continue to spread PL if they leave the trail but this risk would be negligible compared to the long-term benefit to POC persistence from rerouting the trail.

The infestation site that would be bypassed would not be visible to most visitors, although some of the dying trees would be visible through the forest. Eventually, the dead trees would lose their needles and turn grey, which would reduce their visual prominence. There would be a long-term minor to moderate benefit to trail users resulting from year-round access to the Little Bald Hills Trail. Local trail users would receive greater benefit

because they would be able to use the trail year-round. Most out-of-town visitors arrive during the dry summer months when the trail is not closed, so out-of-town visitors would

Within the Smith River corridor, live POC less than 15 inches in diameter would be removed from the localized sanitation sites. There would be very short-term localized adverse effects on visitor access because the trail would be closed temporarily during operations to reroute the trail. These closures are not expected to last more than several days. The removal of these trees would reduce the number of trees with obvious diseased or injured appearance but would also reduce the number of live trees. Some visitors would object to the removal of live healthy trees but park staff would provide information on the need to remove trees to protect the remaining POC within and outside of the parks. There would be a short-term minor adverse effect on the visitor experience from temporary trail closures and removal of small numbers of diseased trees. There would be a long-term minor benefit to visitors from reducing the spread of PL and reducing the number of POC killed by the disease but a short-term minor adverse effect on those visitors who object to removal of live trees in a national park.

Trail improvements are intended to reduce visitor contact with mud or wet areas near POC on the trail. Visitors would not have to negotiate wet or muddy areas along the trails. These trail segments would be closed temporarily while work is being conducted. Closures are short-term adverse effects to visitor access. There is a long-term minor to moderate benefit to the visitor experience from improved trails with year round access.

This alternative would not impair visual quality or scenic resources because POC is not a dominant tree in most of the park vegetation communities. There are no extensive pure stands of POC where dying and dead trees would become a dominant landscape feature. The trail improvements would have negligible temporary localized adverse effects on the surrounding soils and vegetation, and therefore would not impair scenic resources or visual quality either at the project site or in the parks. The location where POC would be removed along the Hiouchi Trail at site 4 is very close to US 199, and to residential and commercial areas dominated by exotic vegetation. The trees to be removed for localized sanitation are small, diseased, and dead or dying. Therefore, removal of these POC would not impair scenic quality.

Alternative Three–Preventative Trail and Road Side Sanitation Throughout POC Areas

This alternative would result in continued seasonal closure of the Little Bald Hills trail as long there are POC seedlings growing within the trailside buffer zone and active infestation in the adjacent buffer. Visitors using the trail would continue to see a sharp visual contrast between the healthy forest and diseased trees. During and following eradication of POC on both sides of some roads and trails, visitors would see a dramatic change in the vegetation structure along the trail that would contrast sharply with forested vegetation beyond the buffer. At the infestation site on the Little Bald Hills trail, diseased trees would still be plainly visible beyond the trailside buffer zone.

Some visitors would experience moderate to significant adverse effects from seeing healthy trees, including large mature POC, cut in a national park for a period of at least seven years.

In the Smith River corridor, visitor use and access to road and trails would generally not be restricted, except as needed to remove trees. There would be no visual impact from cutting of small POC trees. Where large trees are removed and stumps remain, there would be an adverse impact on visual quality until overstory trees fills in the gap and shrubs cover stumps. Small infected trees that are more than about 50 feet from roads or trails would remain as a visual contrast to healthy trees.

Summary of the Effects of the Alternatives

Resource Affected	Alternative 1– No Action	Actions common to Alternatives 2 & 3– Eeducation & Project Planning	Alternative Two– Trail Reroute & Improvements, Localized Sanitation	Alternative Three– Preventative Sanitation
Air quality	Negligible, local, short-term, adverse from soil disturbance for trail maintenance	No effects.	Negligible, local, short-term, adverse from soil disturbance for trail work	Negligible, local, short-term, adverse from soil disturbance from tree removal
Geology, topography and soils	Negligible adverse effects on soils from routine trail maintenance.	No effects.	Negligible adverse from 0.28 ac of soils disturbed for trail reroute and blading of Upper First Gulch Road. Negligible long-term on topography from 3000' trail realignment	Negligible adverse effect on soils from dragging trees out after cutting along roads and trails
Water Resources	Negligible, long-term adverse from loss of POC in riparian areas as the disease spreads unabated. POC not a major riparian species in RNSP and other species would replace POC in the stand.	No effects.	Negligible, local, short-term, adverse from runoff from soil disturbance associated with trail improvements	Negligible, localized, short-term adverse from cutting POC in riparian areas. POC not a major of component of riparian areas at road and trail crossings.
Vegetation and fuels	Minor to moderate, long-term, adverse due to changes in stand structure and species composition associated with loss of POC. Negligible to moderate short-term adverse due to POC mortality related fuels build-up.	Indirect, negligible, positive to the extent that PL spread is reduced. Fuel effects are negligible to minor, adverse in the short-term but positive in the long-term.	Positive on vegetation communities where infestations are eradicated or likelihood of spread is reduced. Minor, adverse where infestations are not treated and infestation spreads. Negligible, short-term adverse resulting from fuel build-up associated with localized sanitation treatments and Little Bald Hills trail reroute, otherwise long-term benefit to fuels.	Positive where likelihood of disease spread is reduced due to lack of hosts on trails and roads. Neglible to plant community structure. Moderate, short-term adverse from fuel increase resulting from the removal of POC from up to 47 acres along trail and roads.
Sensitive Plants	No effects.	No effects.	No effects.	No effects.

Wildlife, including Rare, Threatened and Endangered Species	Minor long-term adverse on wildlife due to mortality of live overstory trees. Minor to moderate localized benefit where snags are created. No effect on most wildlife and fish species.	Minor long-term benefit to the extent that these measures reduce the spread of PL and retain current habitat structure.	Negligible to minor, short-term localized disturbance associated with trail reroute and trail improvements. Minor benefit of increased snags. Negligible to minor, indirect, short-term localized adverse effects on habitat suitable for northern spotted owls and fisher; no direct effects on these species. Moderate, direct, adverse on mardon skippers if crews and equipment access the Little Bald Hills Trail reroute area across skipper habitat when larvae are present.	Negligible to minor adverse on wildlife dependent on large, live overstory trees due to POC mortality over time or removal of large, healthy POC. No effect on most wildlife and fish species in local area around trails and roads. Minor to moderate effects on fish and aquatic species in riparian areas with POC sanitation.
Cultural Resources	None	None	Negligible to minor on traditional cultural properties and cultural landscapes from tree removal. No impact to archeological resources	Potential to impair cultural resources, especially cultural landscapes, from tree removal; aesthetic concerns, disturbance of the historic Kelsey Trail, & ground disturbance associated with tree removal.
Park Operations	Negligible to minor, long-term due to curtailing of management activities Little Bald Hills Trail is closed. Negligible to moderate due to increased likelihood of fire resulting from increased fuel loads as POC die.	Minor, positive to the extent that these measures reduce the spread of PL. There may be minor, adverse effect due to increase in staff time for project planning. Minor adverse as POC considerations are not mandatory and are secondary to safety and protection of property.	Increased time and cost to reroute Little Bald Hills Trail, trail improvements, and conduct localized sanitation. No effect to fire management operations.	Minor, long-term adverse from increased time and cost to locate and remove POC from road and trail corridors. Possible long-term, adverse from increased fuel load resulting from tree removal.
Visitors and Adjacent Communities	Negligible to moderate, long-term due to continued seasonal closure of Little Bald Hills Trail, degraded visual quality, especially along the Little Bald Hills Trai,l as POC continue to die.	Minor, positive to the extent that these measures reduce the spread of PL. No direct adverse effect from delays in fire suppression activities because POC considerations would continue to be secondary to protection of life and property.	Positive, long-term benefits from year-round availability of Little Bald Hills Trail. Minor, short-term, adverse resulting from closure of Hiouchi Trail to remove trees (several days).	Negligible to moderate, long-term due to continued seasonal closure of Little Bald Hills Trail, degraded visual quality as POC continue to die, especially along the Little Bald Hills Trail. Degraded visual quality resulting from removal of trail and road side trees.

CONSULTATION AND COORDINATION

Interagency Coordination

In 1999 RNSP staff invited a USFS Forest Pathologist to make a presentation on POC root rot disease to the management team. On April 11, 2000 RNSP staff and USFS personnel conducted a site visit to the Little Bald Hills infestation site to discuss management options. In 2001 RNSP agreed to support the USFS POC mapping proposal and conducted additional interagency meetings. RNSP met additional times in 2003 and 2004 with USFS forest ecologists, pathologists and POC specialists to develop proposals for management of POC in the parks.

The NPS presented one of the proposals described in this document at the quarterly streamlining meeting with the U.S. Fish and Wildlife Service and NOAA Fisheries in August, 2003. The other proposals were discussed with USFWS in March 2004.

A Biological Assessment was submitted to the U.S. Fish and Wildlife Service on the preferred alternative and the USFWS issued a Letter of Concurrence on July 20, 2004, File Number 1-14-2004-2134.

In December 2003, park staff met with Dr. Erik Jules, professor of biology at Humboldt State University and expert on Port-Orford-cedar root rot disease, to discuss the parks' POC populations and the alternatives available for preventing the spread of root rot disease.

Scoping with Native American Tribes and State Historic Preservation Officer

Notification letters for the preparation of this plan were sent out to the Elk Valley Rancheria, the Smith River Rancheria and the Yurok Tribe on March 31, 2004. A representative of the Smith River Rancheria attended an interagency scoping session held on January 6, 2004, and a site visit to the Little Bald Hills on April 7, 2004. Letters were sent out on February 3, 2004, to 24 people in seven Tribes and Rancherias plus two members of the California Indian Basket Weavers Association, notifying them of the planned public scoping sessions.
A notification letter was sent to the State Historic Preservation Office on March 31, 2004.

Public Scoping Summary

Approximately 107 written notices were mailed to local tribes, organizations, and members of the public February 2-3, 2004 announcing that an environmental assessment was being prepared. Press releases were emailed or faxed to local radio and television stations, and to local newspapers. One letter was received by a member of the public expressing interest in the plan.

Public scoping meetings were held on February 11 and 12, 2004 in Crescent City and Arcata respectively. One member of the public attended each meeting. Issues raised were the effect of trail closure on public access to the parks and the effectiveness of sanitation at controlling the spread of PL.

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Others Consulted
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APPENDIX ONE: FIGURES

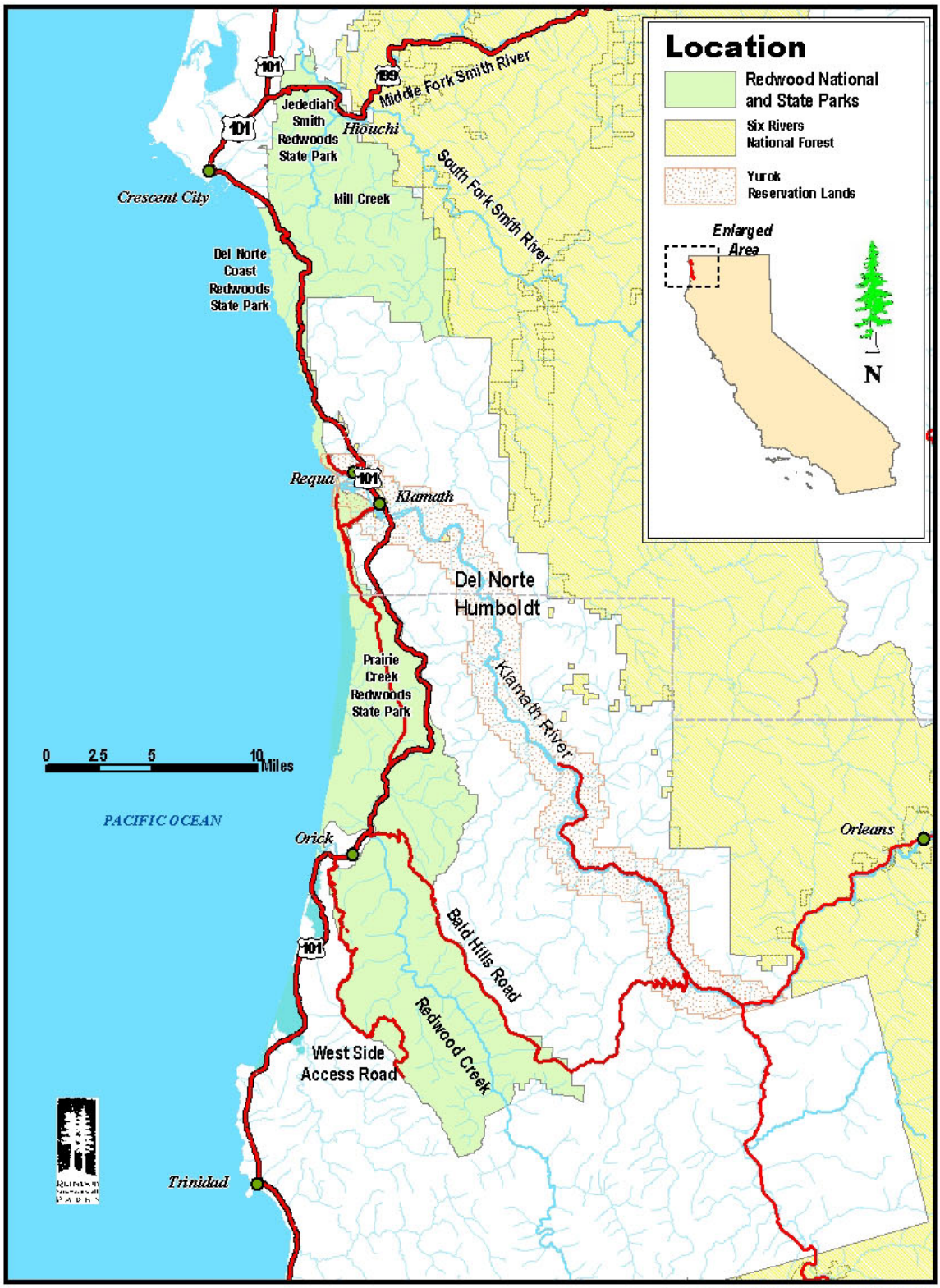

Figure 1. General Location - Redwood National and State Parks

/maps/122_LBHReroute/Figure1_POCPLan.mxd/04.14.04 jw draft

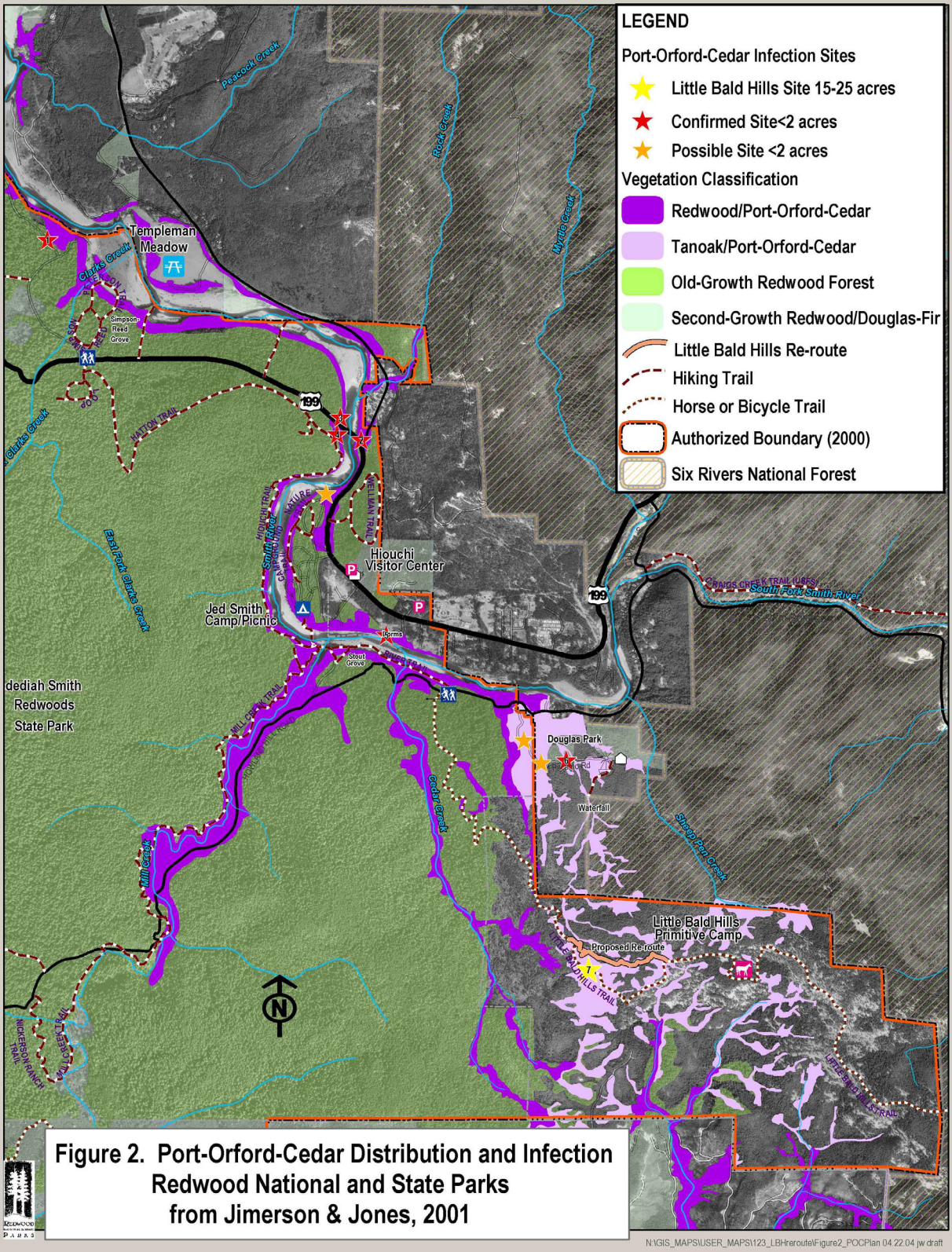

Figure 2. Port-Orford-Cedar Distribution and Infection Redwood National and State Parks from Jimerson & Jones, 2001

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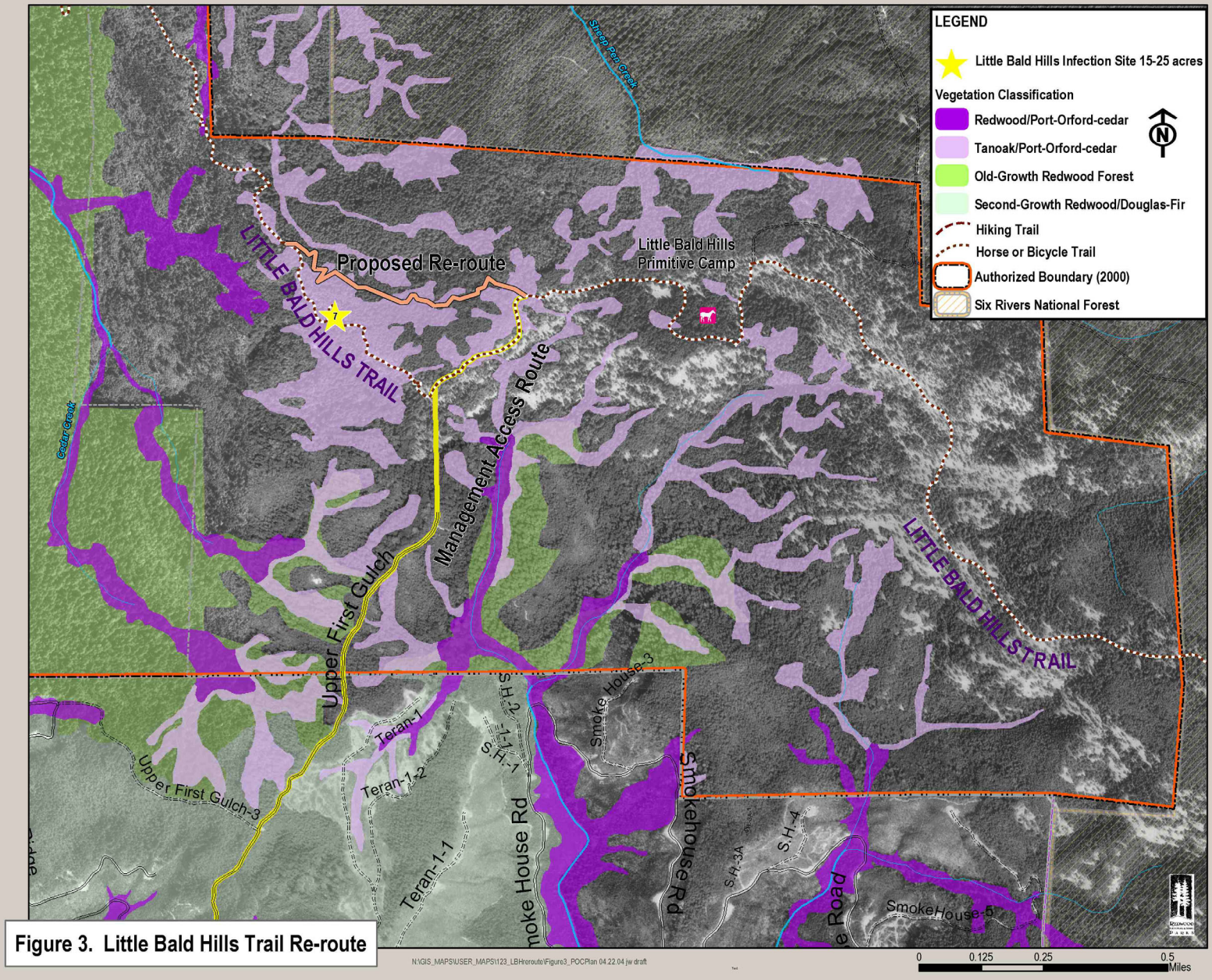

Figure 3. Little Bald Hills Trail Re-route

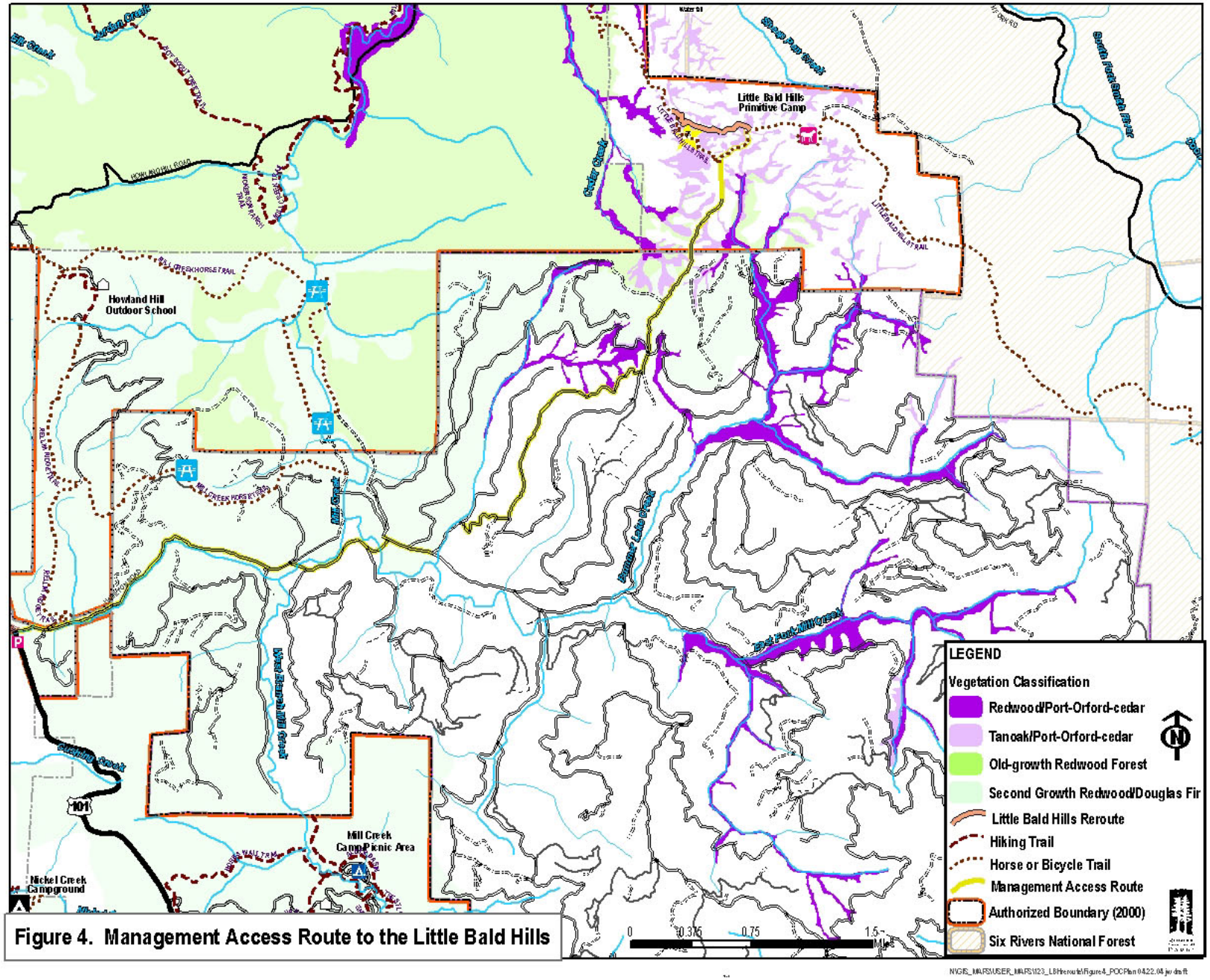

Figure 4. Management Access Route to the Little Bald Hills

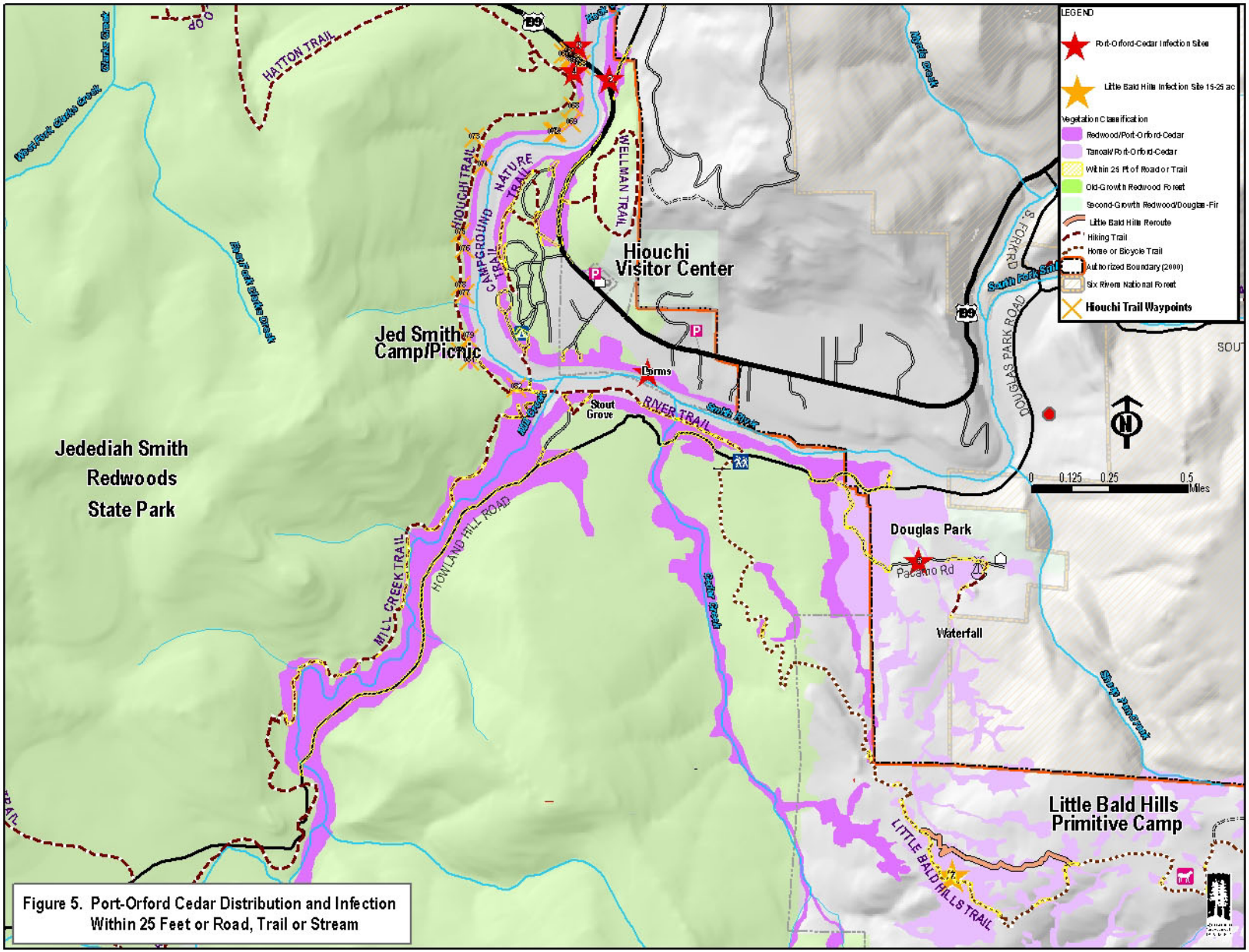

Figure 5. Port-Orford Cedar Distribution and Infection Within 25 Feet or Road, Trail or Stream

APPENDIX TWO: PROJECT ANALYSIS FOR POC ROOT ROT DISEASE PREVENTION

Port-Orford-cedar root rot is spread when spore-infested mud or water is transported from an infested site or watercourse to an uninfested site or watercourse and deposited near a potential host POC tree or into an uninfested watercourse where it can move through the water until a host is encountered. Conditions favorable to the disease becoming established once it has been transported to an uninfested location with available hosts include cool temperatures, moist ground (seeps, streams) and higher abundance of POC in the immediate vicinity – especially down-slope of the introduction location. In terms of introductions of inoculum to a stream from a road crossing, the catchment area or size of the stream is an important factor, as are proximity and abundance of the nearest downstream POC. In many cases, the risk can be mitigated by minor project modifications.

This Project Evaluation Key is intended for use in determining if a proposed project is likely to spread the disease to uninfested POC and if the potentially affected POC would then create a source for further spread or if their mortality would be ecologically significant. Recommendations can then be made for project modifications that would reduce or eliminate the risk of spreading the disease to uninfected POC.

Project Evaluation Key

1. Step 1: Determine if the project as proposed poses a risk of introducing POC root rot disease into an uninfested stand of POC or into a stream or riparian corridor containing healthy POC downstream of the project area:
    a. Does the proposed project take place within, or require movement on unpaved roads through, the areas of the park containing native POC (Smith River and its tributaries)?
    b. Does the proposed project take place in a stream or riparian corridor with healthy POC downstream?

        i. If no to both questions, stop analysis; project may proceed without restrictions.
        ii. If yes to either question, continue with analysis.

    c. Does the proposed project require movement of vehicles or equipment between or through areas with diseased POC (or areas that have been treated for root rot disease within the last 7 years) AND areas with healthy POC?
    d. Does the proposed project take place within an area of infestation?

        i. Answering no to both questions means that work and travel will be confined to paved roads and/or healthy POC areas. Ensuring that equipment and footwear are clean and do not carry infested mud into the project area should be adequate for preventing transmittal of the disease.
        ii. If yes to either, go to Step 2.

2. Step 2: The project is likely to introduce additional risk of infection to uninfected POC. One or a combination of management practices should be recommended to reduce that risk.
    a. If one or more management practices can be reasonably used to reduce the risk, recommend their use

b. If no feasible, practicable or cost effective mitigations can be found, park managers, project proponents and resource specialists must determine weather or not the value of the project outweighs the associated risk of spreading POC root rot disease in the parks or surrounding environs.

Mitigations

- Limiting activities to the dry season;
- Ceasing operations during significant rain events that happen during the dry season;
- Planning activities so that uninfested sites are accessed before infested sites;
- Designating access and egress routes to avoid infested or uninfested POC stands;
- Using uninfested or treated water;
- Implementing road management measures, especially improving road surfaces and drainage;
- Washing vehicles;
- Washing boots, tools and equipment;

Examples

Some example of high-risk activities and possible mitigations are:

- Activity: Road maintenance activities in which equipment is used in an area with diseased POC and then in an area with healthy POC.
    - Mitigations:
        - Work in uninfested areas first
        - Work in the dry season, AND
        - Clean mud off project equipment prior to working in uninfested areas
- Activity: Passing through or between infested POC areas and uninfested POC areas on unpaved roads, in the wet season to do project work.
    - Mitigations:
        - Postpone work until the dry season
        - Reroute access and egress to avoided disease areas
- Activity: Conducting stream surveys in infested and uninfested streams
    - Mitigations
        - Visit uninfested streams first
        - Clean and dry equipment prior to use in uninfested streams that contain POC in the riparian vegetation
- Activity: Hiking cross-country through infested POC stands and into uninfested POC
    - Mitigations
        - Visit uninfested POC stands first
        - Dedicate one set of footwear for use in infested areas and change into clean footwear when leaving an infestation site
        - Schedule work to occur in the dry season
- Activity: Conduct ground disturbing work of any kind in an area of healthy POC
    - Mitigations
        - Ensure that equipment and footwear has not been recently used in a diseased area, or clean it prior to use
        - Conduct work in the dry season